

Aircraft Maintenance Program Manual (AMPM)

**Suborbital Projects and Operations
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Record of Revisions

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GSFC - WFF

Aircraft Maintenance Program Manual

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Section One Introduction

1.1 Purpose

The purpose of the Goddard Space Flight Centers' Wallops Flight Facility (GSFC's WFF) Aircraft Maintenance Program Manual (AMPM) is to specify policy, requirements and standards for the maintenance and quality assurance of assigned aircraft and support equipment.

1.2 Responsibility

The GSFC's WFF Aircraft Office (Code 830) is responsible for the condition and operation of assigned aircraft. Support service contractors are responsible for compliance with this Manual per contractual agreements that are in effect.

1.3 Scope

Aircraft maintenance conducted at GSFC's WFF involves the inspection, servicing, repair and replacement of parts and components of assigned aircraft and support equipment. The level of maintenance activity generally consists of all maintenance requirements up to that performed at depot level facilities. Major airframe structural inspections and repairs as well as major power plant inspections and overhauls are outsourced. Special tool calibrations and major motorized ground support equipment maintenance are outsourced. Aircraft modification work is described in Section 8.

1.4 Organization

Each Section of this manual addresses a specific area of aircraft maintenance as delineated in the Table of Contents. Section 11 describes aircraft maintenance requirements applicable to all aircraft while each appendix to Section 11 provides specific aircraft inspection and repair requirements.

1.5 Authority

This manual constitutes authority for aircraft maintenance policy, requirements and standards relative to assigned aircraft facilities. Conflicting information should be brought to the attention of the NASA Aircraft Maintenance Manager for clarification and resolution.

1.6 Definitions

The following aircraft definitions are commonly used in the conduct of aircraft maintenance:

Acceptance Inspections – Inspections performed when an aircraft, engine, or unit of support equipment is being received from an outsourced maintenance facility, or is being permanently reassigned from another organization.

Aircraft Ground Support Equipment (AGSE) – Equipment used in direct support of aircraft such as: start units, electrical units, servicing vehicles, tow tractors, jacks, work stands, ladders and wheel chocks.

Aircraft Maintenance – The scheduled or unscheduled work on an aircraft that is required to attain and to sustain a state of airworthiness. Such work is conducted in accordance with established requirements and standards as described in this Manual and applicable maintenance manuals for particular equipment.

Aircraft Modification – Any alteration, addition, or removal of aircraft structure, components, equipment, computer software, or primary instrumentation. Routine maintenance is excepted from this definition.

Aircraft Operations – A general term used to describe the operational phase of an aircraft's activity that normally commences with an aircraft's release for flight and terminates with its return to maintenance status. Aircrew training, functional check flights, and mission operations are considered subsets of aircraft operations. "Aircraft maintenance operations" is a general term used to describe non-flight maintenance activity.

Aircraft Services Contractor – The support service contractor providing aircraft services for the Wallops Flight Facility.

Airworthiness – Generally, the capability of an aircraft to be operated within a prescribed flight envelope in a safe manner.

Bench Stock – Expendable material used in the performance of maintenance.

Civil Aircraft – Aircraft other than public or military aircraft. Includes aircraft engaged in carrying persons or property for commercial purposes.

Common Hand Tools – Tools found in common usage such as those applicable to or used on a variety of equipment and components. These items include but are not limited to wrenches, sockets, pliers, etc.

Configuration Control – Configuration control is a process involving conformity to design and is attained when an aircraft configuration and the components installed are consistent with drawings, specifications, and other data that are part of the type certificate, including any supplemental type certificates and field approved alterations incorporated into the aircraft. NASA Program Support aircraft modifications and configuration control processes are described in Section 8 of this manual.

Consumables – Items that are either consumed in use or which lose their original identity during periods of use.

Contracting Officer's Technical Representative (COTR) – A person designated by the CO to be responsible for the technical performance of a contract.

Contracting Officer (CO) – A person with the authority to enter into, administer and/or terminate contracts and make related determinations and findings.

Contractor-Furnished Material (CFM) - CFM are contractor-furnished common hand tools (e.g., screwdrivers, wrenches, sockets, etc.) and other personal equipment not provided by the Government.

Corrective Maintenance – Resolution of a maintenance discrepancy.

Deferred Discrepancy – A fault on an aircraft or unit of equipment that is not serious enough to compromise safety and that cannot be corrected at the time of discovery due to non-availability of parts, manpower, facilities, or equipment. A discrepancy is considered to be a concern but does not meet the definition of a nonconformance.

Deployment – A temporary movement of aircraft and crew to a location other than the assigned base for the purpose of providing operational mission support.

Depot Level Maintenance (DLM) – Maintenance activities requiring extensive shop facilities, equipment and personnel of specialized technical skills. DLM activity consists of repairing, modifying, overhauling, reclaiming, or rebuilding parts, assemblies, subassemblies, components, and end items.

Discrepancy – A fault or concern not meeting the definition of a nonconformance.

Engineering Check Flight (ECF) – A flight authorized by a NASA operations and safety directive for the purpose of validating engineering modifications to a NASA research or program support aircraft. The ECF is usually required following installation of project equipment for a particular mission. Since the ECF validates predicted aircraft performance throughout the aircraft's operating envelope, as applicable, only essential aircraft operating and engineering personnel are permitted to be on board an ECF.

Facilities Operations Manager (FOM) – This is a term used by NASA to describe an individual who is responsible for the safety and operation of a particular facility or building.

Flight Envelope – Aircraft performance limits or limitations approved by the aircraft manufacturer, Department of Defense (DOD), Federal Aviation Administration (FAA), or by NASA through an airworthiness review board process; or by a responsible supervisory official.

Flight Mechanic (FM) – An FM is a flight engineer who performs aircraft maintenance in addition to those duties normally associated with a flight engineer.

Foreign Object Damage (FOD) – FOD describes objects such as stones, debris, or birds that are foreign to normal operating conditions and that can cause damage to personnel and equipment in an aircraft environment. FOD control is a vital part of an aircraft maintenance safety program.

Functional Check Flight (FCF) – A FCF is synonymous with a post-maintenance check flight and has the expressed purpose of flight checking aircraft power plants and systems as required by the GSFC AMPM or other applicable maintenance manual.

Functional or Operational Check – Testing and checking the function and operation of a component on an aircraft or in a shop using equipment, procedures, and limits in the applicable technical directives.

Goddard Procedures and Guidelines (GPG) – A GPG is a GSFC approved publication that provides procedures and guidelines on a particular subject. A GPG is issued in conformance with the Center's quality management system.

Government Furnished Material (GFM) – GFM are Government-provided materials; e.g., sheet metal, metal stocks, fabrics, plastics, special modification to tools, etc.

Hazard Analysis – The technique used to systematically identify, assess, evaluate, and resolve hazards.

Inactive – Aircraft in a non-operational status. This status includes aircraft with potential for future use; aircraft awaiting disposition; aircraft on loan from NASA or used for spare parts; or aircraft acquired for future use.

Intercenter Aircraft Operations Panel (IAOP) – The NASA IAOP performs periodic functional reviews of NASA aviation organizations and is composed of aviation personnel from NASA Field Installations that operate aircraft, representatives from the Aircraft Management Office (AMO), advisors, and from the Office of Safety and Mission Quality, as well as personnel from other NASA Headquarters Offices.

Intermediate Level Maintenance – This maintenance level normally consists of calibrating, repairing, or replacing damage or unserviceable parts, and providing technical assistance.

Material Safety Data Sheets (MSDS) – MSDS describe material that has hazardous characteristics or that requires special or restricted handling.

Mission Management Aircraft (MMA) – MMA are those aircraft owned and operated by NASA to transport personnel in the conduct of official business. These aircraft are sometimes referred to as administrative aircraft and are authorized by Congress for NASA to conduct mission management support. MMA are operated and maintained in accordance with Federal Air Regulations.

Mission – An aircraft flight or series of flights other than routine pilot proficiency, aircraft maintenance, or logistics flight.

NASA Aircraft Inventory – All NASA-controlled aircraft, in both active and inactive status, will be recorded on property control inventories.

NASA-Controlled Aircraft – Aircraft that are bought, borrowed, leased, bailed or otherwise procured or acquired, regardless of cost, from any source for the purpose of conducting NASA science, research, and/or other missions, and which are operated by NASA and/or whose operation is managed by NASA. Aircraft loaned by NASA to another agency/organization are not considered as NASA-controlled aircraft unless so stated by agreement.

Nonconformance – Non-fulfillment of a specified requirement.

Nonconformance Report (NCR) – A NCR is a structured report within the Center's quality management system (QMS) that describes a nonconformance. A corrective action (CA) is required to eliminate a nonconformance.

Operations and Safety Directive (OSD) – An OSD is a GSFC/WFF document that describes and approves a research or program support operation or mission. An OSD is required for all aircraft missions except mission management aircraft missions and training or maintenance-related flights.

Organizational-Level Maintenance – Maintenance activities normally consisting of inspecting, servicing, adjusting, and replacing parts, assemblies, and subassemblies.

Overhaul – The disassembly, cleaning, inspection, repair, or replacement of parts and components. Reassembly and test of any item or accessory in accordance with applicable directives, or authorized manufacturer's publications to provide an operationally safe, serviceable, and reliable item is inclusive within an overhaul.

Preventive Maintenance – Activities aimed at precluding problems or enhancing up-time.

Program Support Aircraft – Those aircraft used primarily for direct support of NASA programs and projects including, such activities as astronaut space-flight readiness training,

science applications, special-purpose cargo airlift, range surveillance, microgravity research, launch security, search and rescue, chase, support of tracking and remotely located sites, and pilot proficiency.

Project Check Flight (PCF) – A PCF is an initial project-related flight in a program support aircraft that is flown to check the functionality of project equipment. This flight is authorized in an OSD and is staffed with project personnel who operate and check project equipment.

Public Aircraft – An aircraft used only in the service of a government or political subdivision.

Quality Assurance (QA) – Those actions taken to assure that work is performed to a required standard. QA is a verification process of attaining certainty that aircraft maintenance meets airworthiness standards, regulations, and procedural requirements. The term “quality control,” as used in the ASC, will be replaced by the term “quality assurance” on October 1, 1999.

Quality Assurance Evaluator (QAE) – A QAE is a Government official who works for the COTR in evaluating a contractor’s quality performance.

Quality Control – A verification process of attaining certainty that maintenance performed on aircraft meets all required airworthiness standards, regulations, practices, and guidelines. The term “quality control,” as it is presently used in the ASC, will be replaced by the term “quality assurance” on October 1, 1999.

Repair – The restoration or replacement of material parts and components as necessitated by wear and tear, damage, or failure in order to maintain equipment in proper operating condition.

Research and Development Aircraft – Those aircraft used primarily for research and development in aeronautics, applications, the study of the atmosphere, and space-oriented programs.

Safety Equipment – Equipment used to prevent injury while performing specific tasks.

Scheduled Maintenance- Periodic, prescribed inspections and/or servicing of aircraft or equipment which is accomplished on a calendar or hourly basis.

Serviceable – Capable of meeting a designed functional requirement.

Special Tools – Tools that are designed and developed to perform a specific maintenance task. These tools include, wheel or bearing pullers, special cradles, alignment devices, vacuum pumps, floor jacks and cranes, engine slings, and those special tools listed in applicable equipment technical orders.

Standard – Acknowledged measurement of performance as determined by the Government.

Standard Aircraft Facility – An aircraft or portion of an aircraft that retains its original unmodified configuration from which modification analyses are based.

Tools – Items used in the performance of maintenance and inspection of equipment, aircraft systems, subsystems, or components.

Transient Aircraft – Unassigned aircraft that land at a base (visiting aircraft).

Unscheduled Maintenance - Those unpredictable maintenance requirements that had not been previously planned or programmed, but require prompt attention and must be added to, integrated with, or substituted for previously scheduled workloads.

1.7 Abbreviations

The following are commonly used abbreviations:

A/C or ACFT	Aircraft
ADP	Automated Data Processing
ADPE	Automated Data Processing Equipment
AGSE	Aircraft Ground Support Equipment
ALC	Acceptable Level of Competence
AMPM	Aircraft Maintenance Program Manual
AOM	Aircraft Operations Manual
ARB	Airworthiness Review Board

ASAP	As Soon as Possible
ASC	Aircraft Services Contractor
ASR	Assurance Status Report
AWM	Awaiting Maintenance
AWP	Awaiting Parts
BN CK	Bench Check
BPO	Basic Post Flight
CA	Corrective Action
CAD	Computer Aided Design
CF	Carried Forward
CFE	Contractor Furnished Equipment
CFR	Code of Federal Regulations
CM	Corrective Maintenance
CND	Cannot Duplicate
CO	Contracting Officer
COB	Close of Business
COP	Copilot
COTR	Contracting Officer's Technical Representative
CTO	Control Tower Operator
CW	Complied With
DN	Document Number
ECF	Engineering Check Flight
EPA	Environmental Protection Agency
ETA	Estimated Time of Arrival
ETR	Estimated Time of Return/Equipment Temporarily Removed
FAA	Federal Aviation Administration
FAR	Federal Acquisition Regulation
FAR	Federal Air Regulation
FC	Functional Check
FCF	Functional Check Flight
FM	Flight Mechanic
FOD	Foreign Object Damage
FOM	Facility Operations Manager
GF	Government Furnished
GFP	Government Furnished Property
GFE	Government Furnished Equipment

GOV	Government Owned Vehicle
GPG	Goddard Procedures and Guidance
GSFC	Goddard Space Flight Center
HAZMAT	Hazardous Materials
HQ	Headquarters
IAOP	Intercenter Aircraft Operations Panel
IAW	In Accordance With
IMTE	Inspection, Measuring, Test Equipment
ISO	International Standards Organization
JCN	Job Control Number
MC	Mission Capable
Mech	Aircraft Mechanic
MMA	Mission Management Aircraft
MSDS	Material Safety Data Sheet
NA	Not Applicable
NASA	National Aeronautics and Space Administration
NCR	Nonconformance Report
NCW	Not Complied With
NDI	Nondestructive Inspection
NDT	Non Destructive Test
NMC	Not Mission Capable
NMCB	Not Mission Capable Both (Maintenance and Supply)
NMCM	Not Mission Capable Maintenance
NMCS	Not Mission Capable Supply
NSN	National Stock Number
OJT	On-Job Training
OPCK	Operational Check
OPS	Operations
OSD	Operations and Safety Directive
OSHA	Occupational Safety and Health Act
PCF	Project Check Flight
PCW	Previously Complied With
PDR	Preliminary Design Review
PG	Procedures and Guidance
PIC	Pilot in Command
PM	Preventive Maintenance

PSA	Program Support Aircraft
QA	Quality Assurance
QAE	Quality Assurance Evaluator
QAP	Quality Assurance Plan
QASP	Quality Assurance Surveillance Plan
QEC	Quick Engine Change
QMS	Quality Management System
RR	Remove and Replace
RRR	Remove and Replace, Reinstall
SAF	Standard Aircraft Facility
SIC	Second in Command
SN	Serial Number
TDY	Temporary Duty
TIC	Third in Command
TO	Technical Order
WAD	Work Authorization Document
WFF	Wallops Flight Facility
WO	Work Order
WOA	Work Order Authorization

Section Two

Quality Assurance and Safety

2.1 Purpose

The purpose of this Section is to describe the requirements and standards associated with the quality assurance and safety in the maintenance and servicing assigned aircraft.

2.2 Scope

The quality assurance and safety provisions addressed in this Section are confined to the maintenance of assigned aircraft and thus, are an integral part of the total quality management system that protects the operation, maintenance, and project support of assigned and visiting aircraft. The scope of this effort embraces all events from the ordering of parts and material through their receipt and installation including fabrication, assembly, rework, repair, modification, testing, servicing, final inspection and completion of records.

2.3 Definition

Quality assurance (QA) is a systematic verification that ensures compliance with requirements and standards applicable to work and material so as to preclude or minimize fault and failure. Reliability and safety are results of quality assurance.

2.4 Policy

The quality assurance plan and program for the maintenance and operation of aircraft shall be compliant with International Standards Organization (ISO) 9000 principles.

To assure quality of work and safety, QA personnel shall be trained and competent. These personnel shall have the autonomy to report to higher authority if necessary to resolve quality and safety matters.

2.5 Objective

The primary objective of QA as it relates to aircraft maintenance is to assure the airworthiness of aircraft and safety of personnel.

2.6 Organization

The Government provides quality assurance surveillance and evaluation through the use of a quality assurance surveillance plan (QASP). The Aircraft Sources Contractor (ASC) provides quality assurance implementation through use of a quality assurance plan (QAP).

2.7 Requirements

1. Assure quality and safety in the aircraft maintenance environment.
2. Assure trained personnel.
3. Assure adequacy, currency and management of technical information.
4. Assure tool control and the use of certifiable tools and equipment through inspections.
5. Assure quality in the procurement and handling of material.
6. Assure quality of workmanship through surveillance, inspection, and effective processes.
7. Assure quality in functional flight checks.
8. Assure airworthiness of aircraft.
9. Assure quality in release of aircraft for flight.
10. Assure accuracy and timeliness in the quality documentation of work, record keeping, and reporting.
11. Assure analysis and evaluation of material and performance trends.
12. Assure control of non-conformance reporting (NCR) of products and services and resultant corrective actions.

2.8 Standards

The quality assurance effort must ensure that the requirements of this Manual and associated contract services are met or exceeded. The performance standards are keyed to those prescribed by ISO 9000 in general, as well as those specified by NASA and the Aircraft Services Contractor's quality assurance plan. Specific workmanship standards for aircraft and equipment are contained in their respective design and maintenance manuals.

2.9 References

- NPD 8730.3 NASA Quality Management System Policy (ISO 9000)
- GPG 8730.4 Quality System

- GPG 8700.1-.4 Design and Technical Review Program
- GPG 1410.1 Document Control
- GPG 5310.4 Product Identification and Traceability
- GPG 8072.1-.2 Process Control
- GPG 8730.1 Inspection/Measuring/Test Equipment
- GPG 5330.1-.3 Inspection and Test Status
- GPG 4520.1 Inspection and Testing
- GPG 5340.2-.3 Control of Non Conforming Products
- GPG 1710.1 Corrective and Preventive Actions
- GPG 6400.1 Handling, Storage, Packaging, Delivery
- GPG 1440.7 Quality Records
- GPG 3410.0 Training
- PG 1410.1.1 Aircraft Office Control of Documents and Data

2.10 Training

Maintenance, quality and safety training is essential to safe and reliable aircraft operations and maintenance. It is GSFC aircraft maintenance policy to comply with all current training requirements and standards as they apply to assigned equipment and working conditions. Requirements vary with changes in aircraft and support equipment assignments and therefore, maintenance managers and supervisors must continually assess training requirements and associated standards. Supervisors define training requirements for each employee. The ASC provides aircraft maintenance training and maintains a training file for each employee. This file contains training, qualifications, and licenses. As a minimum, training shall include initial and recurrent training, as applicable, in aircraft systems, ground support equipment, personal protection equipment, hazardous materials, fire protection and environmental requirements. An annual training plan shall be submitted by the ASC in September of the preceding year to the QAE-Maintenance for fiscal year planning. Training shall be scheduled, completed, and documented in accordance with a quality management system process and be locally available for FAA inspection.

2.11 Technical Publications

Technical Publications that support the operation and maintenance of assigned aircraft and equipment are maintained in a technical library under a quality records and documents standard. The management and custodianship of the technical library is a quality oversight function. The Aircraft Office Technical Library system is described in the GSFC 830-PG-1410.1.1 publication entitled, "Aircraft Office Control of Documents and Data." Government approvals and

authorizations relative to the content of the library and expenditure of funds are granted through the designated QAE personnel for operations and maintenance, respectively.

2.12 Maintenance Safety

Aircraft maintenance safety is a primary responsibility assigned to quality control and assurance organizations in addition to that responsibility assigned to aircraft maintenance management and specific individuals. Quality assurance (QA) personnel shall work closely with QA and safety personnel of interfacing organizations to ensure that all facets of maintenance safety are comprehensively addressed. The ASC shall ensure that maintenance safety is a key part of the contract quality, health and safety plans.

2.13 Records and Reports

The ASC QA organization is responsible for quality record keeping and aircraft maintenance-related documentation. Records shall be maintained in active files for 1 year and in archive files until subject aircraft or equipment is transferred or excessed. Refer to Section 10, Appendix B, for a listing of quality records.

Section Two

Appendix 2A:

Tool Control Program

2.A.1 Purpose

The purpose of a tool control program is to prevent foreign object damage (FOD) to aircraft and the subsequent failure of equipment and injury of personnel.

2.A.2 Scope

This program shall apply to all aspects of maintenance operations that are under the authority of the Aircraft Office and shall involve home station as well as deployed operations.

2.A.3 Responsibility

Mechanics, technicians, inspectors, supervisors and project personnel are responsible for program compliance. Mechanics, technicians, and project personnel are directly responsible for control of tools, equipment, and supplies that they use on or aboard aircraft. Inspectors and supervisors are responsible for enforcement. Supervisors are responsible for maintaining a current master list of individual and special tools.

2.A.4 Description

The Tool Control Program is a tool and associated hardware accountability program for all work on aircraft. Two methods of accountability are used. Method I involves shadow stowage of tools and equipment. Method II involves the use of an inventory checklist for those tools and hardware that are not maintained in shadow stowage. Mechanics and inspectors are issued individually identifiable tool pouches to carry tools and hardware from toolboxes or shops to the work site. Tool inventory checklist forms will be included in each tool pouch.

2.A.5 Procedures for Maintenance Personnel

The following procedures will be used in the implementation of the tool control program: (Refer to Page 2A-4 - Tool Control Flow Diagram).

A. Jet intake, compressor, and flight control areas are designated as “FOD Critical Areas.” Work performed in or around these areas shall be documented in the Aircraft Maintenance Logbook, Form 1103C. Upon completion of the work, an inspection will be performed by a qualified aircraft inspector. This inspection shall be performed and documented in the aircraft logbook prior to reassembly of component and/or close-up of work area. The inspection and

documentation shall include an accounting of all possible FOD material. The FOD Logbook is a quality record.

B. In accordance with Tool Control Method I, tools and hardware that can be satisfactorily "shadow stowed" as determined by maintenance management do not require accountability by inventory checklists. When a special tool is removed from its shadowed location the person removing the tool will place in the empty shadow location a tool chit containing the persons tool box number. This number will be used to identify the person who removed the special tool. Tool Control Method II applies to remaining tools and hardware that require the use of inventory checklists.

C. Shop areas and toolboxes shall be maintained in a clean and orderly manner. All unnecessary tools and hardware that are not needed for daily work shall be removed or properly stowed.

D. All toolboxes used in the work place shall have shadow stowage.

E. All tools that are owned by or assigned to a mechanic shall have the mechanic's initials permanently inscribed on the tool. Calibratable items owned by personnel shall not be stored or used in the workplace. A current master listing of each mechanic and technician's tools shall be maintained by contractor quality assurance personnel.

F. All tool pouches shall be maintained in a clean and empty condition except when being used for a specific job. At that time, the pouch will only contain those items required for a particular task. A listing of tools and material contained in a tool pouch shall accompany the tool pouch when Method II accountability is used.

G. Portable toolboxes that are completely shadow-controlled do not require the use of inventory checklists.

H. Equipment and parts that are not adaptable to shadow stowage will be controlled by use of inventory checklists.

I. If a tool or other piece of hardware is missing, the responsible mechanic shall immediately report the incident to Quality Assurance and Maintenance supervisory personnel. As a result, the aircraft will be grounded and a descriptive entry shall be documented in the aircraft

maintenance log. The contract maintenance supervisor shall advise the QAE of this situation as soon as possible. If the missing item cannot be found after a thorough search; disassembly of work performed when the item was lost shall be authorized if deemed appropriate by ASC and Government maintenance and quality officials.

2.A.6 Procedures for Project Personnel

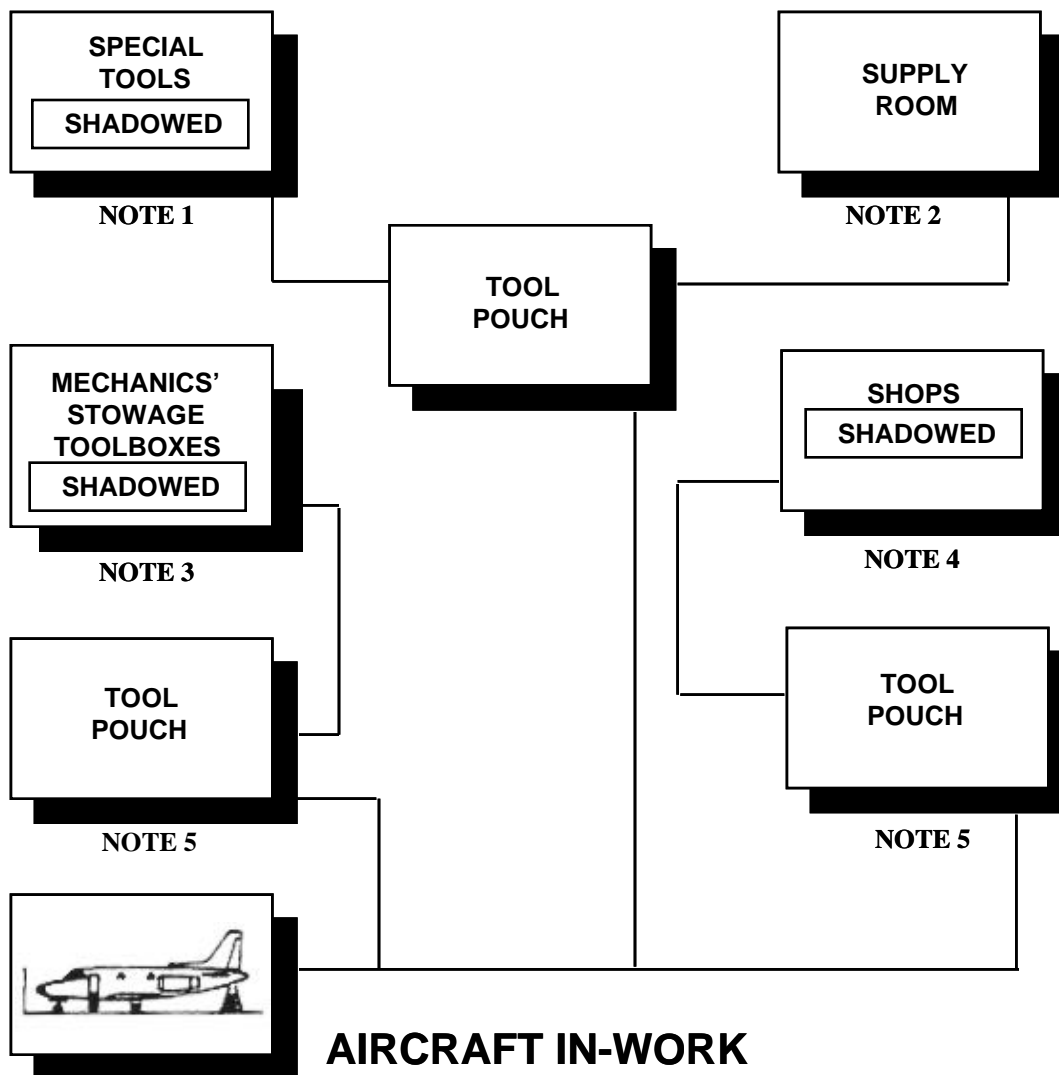
- A. Tools used aboard aircraft shall be limited to those required.
- B. When a tool is not being used, it shall be placed in a secure toolbox or container. Unsecured tools and equipment may be subject to confiscation if left unattended.
- C. Prior to flight, all tools and equipment shall be securely stowed.
- D. No in-flight maintenance of project equipment shall be permitted without the approval of the aircraft commander. Mission essential work will normally be permitted on a case-by-case basis, depending upon safety factors such as turbulence and electrical considerations. All tools and equipment must be securely stowed for landing.
- E. An aircraft may support more than one project during a particular period of time. Therefore, it is important that project personnel maintain their respective stations in a secure state of readiness unless specifically released from this requirement by the Aircraft Programs Branch.
- F. Missing or lost tools shall always be brought to the attention of the aircraft Maintenance Supervisor, or the flight crew, depending upon aircraft ground or flight status.

2.A.7 Basic Tool Control Flow Diagram

Refer to the following page for Basic Tool Control Flow Diagram.

2.A.8 Inspection, Measuring and Test Equipment (IMTE)

All inspection, measuring, and test equipment (IMTE) used by the Aircraft Office (Code 830) shall be tracked and controlled by the Code 830 ASC and calibrated by a certified calibration laboratory in accordance with GPG 8730.1. Serial numbers of any IMTE used to work on an aircraft or its parts/components will be recorded in the IMTE Usage Log, which is to be kept with the special tools and equipment. The identification of the aircraft, parts, or component will also be entered in the log to allow traceability. IMTE will be signed out for each maintenance action where use is required. The log will not be used for any other purpose than stated in this paragraph.



NOTES:

1. Tools removed from the Special Tool storage shall be accounted for by use of chits. A tool inventory checklist IS NOT required.
2. Equipment and parts removed from the supply room shall be inventoried on a checklist and placed in a clean tool pouch.
3. Tools from mechanics' shadow tool boxes may be placed in a clean tool pouch. A checklist for tool and hardware accountability IS required.
4. Tools, equipment and parts from shops where shadowed stowage is not used shall be inventoried on checklists and placed in clean pouches.
5. All tool pouch contents shall be listed on a pouch inventory checklist.

Basic Tool Control Flow Diagram

Section Two

Appendix 2B:

Quality Standards for Flight Release and Functional Checks

2.B.1 Certification for Release of Aircraft for Flight

The following maintenance actions and conditions require a maintenance and quality assurance signature certification to verify quality and completeness of work prior to a maintenance release of the aircraft for flight status. This list is provided as a guide and is not considered to be all inclusive. A quality assurance inspection is required to be performed for all maintenance actions and conditions that could result in compromise to airworthiness and safety of flight. Refer to Section Ten for amplifying information.

- A. Engine change or removal and reinstallation.
- B. Fuel control or adjustments to fuel metering system.
- C. Turbine unit or hot section component change.
- D. Removal and replacement of any major engine component, including bleed air and EDC systems.
- E. Propeller change or removal and reinstallation.
- F. Propeller governing or regulating component change.
- G. Maintenance on propeller control systems including rigging and adjustment.
- H. Maintenance on flight control systems including replacement of components, rigging, and adjustment of these systems.
- I. Replacement of landing gear components and adjustments to the system.
- J. All work performed on pitot static systems.

- K. Maintenance on pressurization systems, including replacement of components and adjustment.
- L. Repair of aircraft primary structures, including pressure bulkheads on pressurized aircraft.
- M. All scheduled maintenance.
- N. All modifications or alterations.
- O. Maintenance that requires a functional check flight as specified in this publication.

2.B.2 Conditions Requiring A Functional Check Flight

The following conditions are those that generally require a functional check flight (FCF) as described in Section Ten. Prior to an FCF, the FCF crew will receive a detailed briefing by QA personnel on the maintenance work performed and specific FCF requirements. This briefing shall be documented in the aircraft maintenance log.

- A. When verification of satisfactory operation cannot be accomplished on the ground.
- B. When fixed or movable flight control surfaces have been removed and replaced or when major repairs have been made on these surfaces (excluding trim tabs).
- C. When flight control actuators, cables, or rods have been replaced or re-rigged and when flight control mechanisms have been readjusted.
- D. When components of the landing gear retracting system affected by air loads are replaced, reinstalled, or adjusted.
- E. When major structural repairs have been accomplished.
- F. When one or more engines have been replaced or reinstalled.
- G. When turbine units or hot section components have been replaced on turbine engines.

- H. When EDC or major pressurization components have been replaced.
- I. When propellers or governing and controlling mechanisms have been replaced.
- J. When an aircraft is removed from extended storage.
- K. When required by airworthiness directives, service bulletins, or other technical directives.
- L. When helicopter main or tail rotors or rotor drive system components have been replaced or adjusted.
- M. When helicopter rotor control system components have been replaced or adjusted.
- N. When major or depot inspections have been accomplished.
- O. When modifications or alterations have been completed on aircraft or components that may affect the flight characteristics or system operations.

Section Three

Hangar and Flight Line Operations

3.1 Policy Requirements and Standards

3.1.1 Hangar Operations

The following requirements are applicable in and around the hangar area:

1. Requests for Hangar Space

Hangar space within Hangar N-159, the primary NASA hangar, is limited. Visiting projects that require project use space should request space from their project sponsors at Wallops. Sponsors of projects will coordinate arrangements for shop and hangar bay space with the Aircraft Maintenance Manager (QAE-Maintenance) or the aircraft services contractor (ASC) maintenance supervisor.

2. Hangar and Flight Line Orderliness and Cleanliness

Normal hangar deck upkeep includes the daily removal of dust, dirt, litter and accumulation of trash, and is the responsibility of the ASC. Assistance in cleaning the hangar and shop areas is provided by janitorial personnel. Accumulations of oil, grease, liquids, and used material shall be cleaned up by maintenance personnel prior to the end of each working day.

Visiting project aircraft maintenance crews are responsible for keeping their areas of the hangar deck and the flight line in a clean and orderly condition. Drip pans shall be used and kept clean inside the hangar. Excess oil and grease on the flight line shall be removed. Loose material, tools, parts, work stands, and benches shall not be left unattended on the flight line nor stowed in a disorderly or unsecured condition.

3. Storage, Handling, Preservation, and Disposal of Hazardous Materials

Hazardous materials shall be handled and stored in accordance with GMI 1773.1 and OSHA standards. Materials such as oils, cleaning solvents, paint remover, paint thinner,

water/methanol or other flammable material shall be stored in compliance with HAZMAT requirements.

Hazardous waste shall be staged (satellite accumulation point) at a designated and approved location and stored in compliance with Code of Federal Regulation (CFR) 40, Sections 260-299.

The ASC shall report any observed hazardous conditions to the QAE-Maintenance as soon as possible. Environmental emergencies shall be reported immediately by observing personnel in accordance with GSFC's WFF Environmental Contingency Plan. (See Appendix 3A.)

4. APU and GPU Operation Inside Hangar

Aircraft or internal combustion ground power units other than approved tow tractors shall not be operated inside the hangar. Exceptions must be approved by the FOM/QAE-Maintenance.

5. Use of Grease Solvents or Liquid Sprays Inside Hangar

Under certain conditions and when approved by the Hangar FOM/QAE- Maintenance limited use of approved cleaning solvents for engine and parts cleaning may be permitted inside the hangar. As a general rule, this type of aircraft and engine maintenance work is performed outside the hangar in a predesignated location. Spray painting of aircraft in hangars shall be limited to minor touch-up work, as approved by the contract maintenance supervisor and FOM/QAE-Maintenance.

3.1.2 Use of Battery Powered Hand Tools and Lights

The use of battery powered hand tools and lights on or in the immediate vicinity of aircraft may be permitted provided the following basic standards are followed:

1. The tools must be approved for use by the QAE-Maintenance and ASC maintenance management and QA officials.
2. The operator of the tool must have proper authorization from supervisory personnel.

3. Battery powered tools and lights shall not be used in fuel tanks, wheel wells, or other enclosed areas where trapped fuel fumes may exist unless such tools and lights are specifically certified and approved for such use.

NOTE: Caution, safety, and common sense must prevail at all times when battery-powered tools and lights. Prior to use, an inspection must be accomplished to ensure that no open fuel panels nor evidence of fuel fumes and other flammable materials exist in the area of anticipated use.

3.1.3 Smoking by Personnel

Smoking or open flames shall not be permitted within 50 feet of any parked aircraft. Smoking is not permitted inside NASA owned buildings.

3.1.4 Fire Precautions for Flight Lines and Hangar Areas

1. Flight line crew and maintenance personnel shall have, as a minimum, a 50 pound fire extinguishers bottle readily available for immediate use during engine starts. In addition, the services of a fire fighting vehicle, shall be used for maintenance and operational conditions when additional protection is advisable.
2. All aircraft engine start and run-up operations shall have a radio in operation for the purpose of calling for assistance in the event of an aircraft fire.
3. Aircraft aisles and areas that provide access to fire extinguishers and fire equipment shall be kept clear of obstructions.
4. All fuel spills shall be reported to the fire department who in turn will take immediate action to wash down or neutralize the spills. During such times, maintenance operations will cease and the area be cleared of personnel.
5. An adequate number of fire extinguishers shall be properly located throughout the flight line area. All extinguishers will be sealed and periodically inspected. Primary inspection responsibility is with the fire department, however, maintenance personnel shall report any extinguishing equipment that is out of date. Personnel will not break fire extinguisher seals unless they are actually going to use the extinguisher. In the event that a fire extinguisher is partially or completely discharged or damaged, the fire department shall be

notified immediately and the extinguisher recharged, repaired, or replaced. In no case will the contents of an extinguisher be partially used and the extinguisher resealed prior to filling.

6. Drip pans or containers to retain excess oil or fuel spillage shall be used in hangars.
7. Prompt removal of trash, debris, contaminated oils, fuel, and other fluids from the hangar is required.
8. Proper grounding and bonding of aircraft and fuel tankers is required to ensure the safe dissipation of static electricity during all fueling and defueling operations. Aircraft parked inside hangars shall be properly grounded at all times.
9. Proper placement of power units (maximum distance from aircraft consistent with cable length) and fire extinguishers relative to aircraft location is required.
10. Welding or arc cutting operations are performed when required by certified personnel from an external supporting organization. Welding or hot cutting will not be permitted on or near aircraft unless specifically authorized by the ASC maintenance supervisor and QAE-Maintenance. Nondestructive test (NDT) will be performed by certified personnel in accordance with NAVAIR 01-1A-16. Records are maintained with ASC-QA.
11. Aircraft shall not be fueled, defueled, serviced with oxygen, or undergo fuel transfer inside hangars. In the event that such is required approval must be obtained through the QAE-Maintenance. The internal transfer of fuel within an aircraft fuel system is not considered a fueling operation.

3.1.5 Operation of Vehicles and Ground Support Equipment on Flight Lines and Parking Ramps

Aircraft ground support equipment (AGSE) and service vehicles are a necessary and an integral part of all aircraft servicing operations. Equipment operators must exercise extreme care since these vehicles are required to work in close proximity to parked aircraft and confined spaces. The following requirements apply to operators who are involved with the operation, care, supervision, or servicing of this equipment:

1. Only personnel who are qualified, certified, and authorized by the contractor (ASC) or QAE-Maintenance will operate assigned AGSE.
2. All operators of AGSE shall inspect their vehicles for defects prior to use. Defects shall be reported to supervisors without delay. Supervisors shall not assign or require personnel to operate AGSE with an unsafe condition.
3. Operators shall not leave a vehicle with the engine running near an aircraft. When parking a support vehicle near the aircraft, parking brakes shall be set and the transmission selected to "Park" to preclude inadvertent collision.
4. Motor vehicle operators must possess an appropriate valid state driving license to operate Government motor vehicles.
5. When emergency vehicles are observed, other vehicles shall be stopped or positioned clear until the emergency has passed.
6. Vehicle operators shall drive at a speed that is reasonable and proper. The flight line speed limit is 20 mph and shall be enforced at all times by supervisory and security officials.
7. Operators of AGSE shall not back a vehicle while in the immediate vicinity of an aircraft unless for the specific purpose of loading/unloading cargo or attaching a vehicle to a tow bar. In such cases, the driver shall not begin backing action until a guide person is clearly visible and the signal for movement to begin is given.
8. AGSE shall not be left standing or parked in front of aircraft when aircraft engines are in operation or about to be placed in operation. AGSE shall not be operated or parked in any position that might receive damage from aircraft engine or propeller blasts.
9. Proper and adequate headlights, tail lights, and stop lights shall be on vehicles operated during the hours of darkness. Vehicle operators shall always be alert for personnel on foot in the flight line area.
10. Personnel shall not ride on top of material being transported by motorized equipment, nor will personnel get on or off motor vehicles while they are in motion.

11. All equipment, including cranes, fork lifts, power units, servicing equipment, and other units not specifically mentioned shall be positioned by qualified personnel to ensure that accidental contact with aircraft is avoided. Aircraft will be chocked prior to moving AGSE toward aircraft. All AGSE rolling equipment near aircraft will be chocked to prevent accidental movement.
12. All power units shall be unplugged from the aircraft and the cables properly stowed prior to movement of either the aircraft or power unit. When the need for such units has been satisfied, they shall be returned immediately to the designated parking areas.

3.1.6 Aircraft Towing

Aircraft towing shall follow the guidelines and procedures contained in the applicable Flight Manual or technical orders for the particular aircraft. The following general standards are applicable:

1. A qualified supervisor shall be in charge of each towing operation. No aircraft will be moved unless a qualified pilot or qualified maintenance person is in the cockpit for the specific purpose of operating the wheel brakes and any other controls necessary for ground operations. Aircraft will not be towed without the landing gear pins installed, as applicable.
2. An aircraft window shall be open if available on the pilot's side during the period of the towing operation to allow for conversation between the cockpit brake operator and the supervisor.
3. The person in the cockpit shall not release or set the aircraft brakes until ordered to do so by the supervisor in charge of the overall operation.
4. Wing walkers shall always be employed when towing in close proximity to other aircraft or obstructions.
5. When backing an aircraft in congested or confined areas, the supervisor will be position him/herself so he/she can be seen by both the tug operator and the cockpit occupant.

6. Standard international aircraft marshalling signals shall be used for all towing operations. (Refer to illustrations in this Section.) Maximum towing speed shall never exceed five miles per hour.

3.1.7 Engine Ground Run-Up Policy

Engine run-up of assigned aircraft for maintenance purposes shall be conducted by those personnel who have been authorized and qualified by supervisory personnel. Positioning of aircraft for engine run-up operations shall be in locations that do not present a noise or exhaust problem for personnel or property. On the N-159 ramp area, run-up operations shall be east of the double red safety line. Precautionary fire protection equipment shall be pre-positioned and readily available, as needed.

3.1.8 Aircraft Operations on Flight Lines and Ramps

In addition to precautions and guidelines previously established in aircraft flight manuals or technical orders for individual aircraft types, the following standards shall apply to aircraft ramp operations at Wallops Flight Facility:

1. A qualified pilot or qualified maintenance person who is authorized to start and run up engines shall be in the pilot's seat of the aircraft involved or the flight engineers seat, depending upon type aircraft involved. Engine start and run up from the flight engineers crew position seat requires an additional qualified brake operator in the pilots crew seat position. Radio contact with the Control Tower is to be maintained during engine operation.
2. The supervisor of the run-up activity shall ensure that the surrounding area is clear of equipment and material that may be subject to damage from engine and prop blast. Run-ups will be accomplished so air blast in no way affects aircraft in the process of taxiing, taking off or landing.
3. A member of the ground crew shall be in continuous contact by interphone (on aircraft so equipped) with the person operating the engines. On aircraft not equipped with a system for interphone communications, a ground observer shall be stationed so as to be visible and to give proper signals to the person operating the engine.
4. The person who starts, operates, and checks aircraft engines shall use applicable checklists.

5. All persons, vehicles, and other aircraft shall be prohibited from passing immediately behind or in front of a jet engine in operation. When necessary, a member of the ground crew shall be positioned to enforce this precaution.
6. Access doors and cowling subject to damage from propeller and jet blasts shall be secured or removed prior to ground testing engines.
7. Maintenance shall not be performed at inlet ducts of operating jet engines.
8. Approved noise suppression devices shall be used by personnel working in areas where sound hazards exist.
9. In the event that jet engines must be operated on the ground for a prolonged period of time, the aircraft will be moved to an isolated area to reduce personnel hazards and interference with other nearby operations.

3.1.9 Taxi

Only pilots qualified in aircraft type (or those under the supervision of an instructor pilot in type) shall be authorized to taxi assigned aircraft. All taxiing shall be done in accordance with the approved taxi checklist and taxiing procedures contained in the official operating manual for the aircraft. Wing walkers shall be used during taxi operations when in close proximity to other parked aircraft, vehicles, buildings, or other obstructions. Taxi speeds shall be maintained within safe operating limits.

3.1.10 Aircraft Launch and Recovery Procedures

Safety is the paramount consideration during aircraft ground operations. Injury to ground crew personnel and damage to equipment is likely if communications are deficient between ground and flight crew personnel. To enhance safety and effectiveness of aircraft launch and recovery operations procedures have been standardized as follows:

1. Ground crewmen shall be knowledgeable of and use standardized international aircraft marshalling signals.
2. Ground crewman shall use personal safety equipment (eye and hearing protection).

3. Prior to engine start the ground crewman shall ensure that no vehicles, equipment or obstacles are located in the immediate vicinity or in the path of the aircraft. If an air start unit is required, the unit shall be removed immediately after the initial engine start and prior to additional engine starts. The main landing gear wheel chocks will be removed and one set of chocks placed under the nose wheels until ready to taxi.
4. The ground crewman shall maintain positive visual contact with the pilots. If possible, verbal communication between the ground and flight crew shall be maintained by use of ground radio communications (mobile radio or ICS). If visual contact or communication is lost between the ground and flight crew as applicable, ongoing activity must be considered for termination by the PIC until communication is reestablished.
5. Upon the pilot's command to "remove chocks" the ground crewman shall receive confirmation from the pilot verifying that the brakes are applied or set prior to stowing the ICS ground cord, if used, and removal of the nose wheel chocks. The ICS ground cord shall be stowed and secured by the ground crewman prior to removing the nose wheel chocks. When stowing the ICS ground cord, the ground crewman must remain alert and aware of inadvertent forward movement of the aircraft to avoid personal injury. During nose wheel chock removal (and relocating clear of the taxi path), the ground crewman must maintain visual contact with the aircraft for awareness of inadvertent forward movement.
6. During aircraft recovery, the pilot shall follow the taxi director's signals. Brakes and brake pressure must be used and monitored as required until the wheel chocks are installed.
7. Aircraft shall not be towed unless landing gear downlock pins have been installed, as applicable.

If deviation from these procedures is required such as during deployed operations, the interim procedures shall be thoroughly briefed by the PIC and understood by the ground and flight crew.

3.1.11 Flight Line Security

Aircraft parked on ramps and flight lines shall be chocked when not being driven or taxied. The tie down of aircraft shall be accomplished in accordance with the instructions and guidelines

set forth in applicable flight manuals or technical orders pertaining to individual types of aircraft. During periods of high winds or when high winds are forecast, all appropriate tie downs shall be utilized. Responsible maintenance supervisors and managers shall ensure that all aircraft under their control are properly secured while parked on the flight line. Each pilot and project manager of visiting aircraft operating at Wallops Flight Facility should check with the Meteorological Office prior to securing each day in order to determine the need for additional precautions for high winds or extreme weather be forecast during non-working hours. In addition to aircraft security during forecasted high wind conditions, responsible aircraft maintenance and project personnel shall ensure the security of all special equipment and material in use on the ramps or flight line. Protection of aircraft and associated equipment from adverse weather shall receive high priority. Aircraft that cannot be protected through use of hangar space shall be considered for fly-away. Aircraft involved with high priority missions shall normally receive hangar bay storage.

3.1.12 Oxygen Servicing

Only trained and qualified personnel who have been certified in writing by the Maintenance Supervisor shall be authorized to handle or transfer liquid or gaseous oxygen. The following precautionary standards shall be taken when servicing oxygen:

1. No aircraft shall be serviced within 50 feet of hangars, structures, or any source of ignition (hot exhausts, sparks, flame, smoking, smoking or operating ground cart).
2. Connect the aircraft and oxygen cart to an approved ground during oxygen servicing.
3. Check that the aircraft external electrical power is disconnected and battery switch is in the "Off" position.
4. Aircraft shall not be serviced with fuel or oil during oxygen servicing operation.
5. Other maintenance shall not be performed on an aircraft during oxygen servicing operations.
6. Personnel shall wear a face shield, full-length apron, hat and protective gloves when handling liquid oxygen. Drip pans or other suitable containers shall be positioned under the overflow vents of the aircraft being serviced with liquid oxygen to prevent contact with ramp.

7. Do not handle tubes, fittings, or overflow containers carrying liquid oxygen with bare hands. If skin adheres to liquid oxygen equipment, attempt to carefully free immediately.
8. Keep all petroleum products (oil, grease, fuel, etc.) away from oxygen equipment.
9. Ensure quality of oxygen transfer lines through regular inspections.

3.1.13 Fueling and Defueling of Aircraft

During aircraft fueling or defueling operations, the following standards and safety precautions are applicable:

1. Prior to aircraft fueling or defueling, the aircraft shall be bonded between the servicing vehicle and aircraft. (Alternate three-way grounding provisions that tie the servicing vehicle to ground, aircraft to ground, and servicing vehicle to aircraft may also be used.)
2. Refueling personnel, AGSE operators, and other equipment specialist shall be trained and qualified in applicable regulations. Fire guards shall have the proper type fire extinguishers and maintain a visual surveillance of the operating units throughout the fueling operation.
3. Ground power units and other equipment that may emit sparks, heat, or flame shall be positioned with consideration for direction of wind, slope of ramp, and location of fuel vents on aircraft. AGSE shall always be placed at the maximum distance permitted by the length of their power cables and at an angle that provides the greatest clearance from the aircraft. Only approved power cables with an adequate length shall be used during fueling and defueling operations.
4. Fueling or defueling operations shall not be conducted within a radius of 100 feet of operating aircraft or within 100 feet of hangars, measured from the fueling/defueling point.
5. During aircraft fueling operations, only required maintenance personnel will be aboard the aircraft.
6. Fueling or defueling operations shall be stopped immediately upon detection of fuel leakage or seepage from equipment until repairs are made and fuel spills neutralized.

Fueling operations shall be halted for fuel spillage and the area cleared of all personnel. A guard shall be posted to keep personnel from spillage areas and operations will not be resumed until approved by fire officials.

7. Fueling personnel shall visually inspect fuel hoses prior to commencement of fueling.
8. Aircraft shall be properly chocked during fueling operations.
9. Fueling operations shall be suspended and fuel hoses disconnected when an electrical storm is within three miles of the field or during a fire, aircraft crash, or crash warning. Fuel trucks shall be removed from the area of the aircraft when these conditions exist.
10. A serviceable 50-pound fire extinguisher with long hose shall be properly located in the vicinity of aircraft being serviced along with personnel who are readily available for its immediate use unless a greater extinguishing capability is used..
11. No maintenance shall be performed on aircraft being fueled or defueled, nor will any other concurrent servicing be conducted (i.e., alcohol, oxygen, or hydraulic fluid).
12. Personnel in the area of aircraft being fueled or defueled shall observe the “No Smoking” rule and shall not carry matches or mechanical lighters near the operation. Personnel shall exercise care not to create any friction or static sparks in the handling of tools, metal equipment, wearing of metal shoe taps or nylon clothing which produce charges of static electricity.
13. The fuel truck shall be located as far from the aircraft as fuel hose length will permit and the truck parked in the best position to be driven or towed away from the aircraft in case of emergency.
14. Fuel nozzles shall not be locked or blocked in an open position but shall always be manually controlled.
15. Care shall always be taken when topping off fuel tanks to prevent overflow.

3.1.14 Aircraft Jacking

Supervisors shall ensure that jacking crews are prepared and understand the objectives, procedures, and precautions necessary to safely perform aircraft jacking operations. The following basic requirements are applicable:

1. Jacks and other equipment shall be serviceable and available in proper numbers. Faulty equipment shall not be used.
2. Ramp or hangar areas shall be cleared of all unnecessary equipment and material in the immediate vicinity of jacking operations. No aircraft shall be positioned and placed on jacks that would block other aircraft from exiting the hangar. Hangar doors shall not be open during jacking operations if winds exceed 5 knots.
3. Jacking crews shall always include a qualified supervisor and a sufficient number of qualified crewmembers to perform the operation.
4. The assigned supervisor shall ensure that each member of the jacking crew is qualified and that specific locations and duties are understood.
5. The assigned supervisor shall ensure that the area around the aircraft is cordoned off and appropriate warning signs posted; that safe procedures are utilized, and that proper checklists are used for the particular requirements and conditions.
6. Jacking of aircraft is permitted outside the hangar only if absolutely necessary. Under these conditions, the above procedures are applicable except that wind conditions must be less than 10 miles per hour and jacking surface must be level and capable of supporting the aircraft.

3.1.15 Aircraft Washing and Cleaning

Prior to washing aircraft, the following general precautions shall be taken:

1. The aircraft batteries will be disconnected and protected.
2. Only approved cleaning soaps, compounds, and solvents shall be used. Personnel shall avoid breathing harmful or toxic fumes and avoid skin contact with cleaning materials, acids, or strong alkalis. All spray nozzles shall be operated only by qualified personnel.

3. Personnel shall not climb or walk on external surfaces of aircraft during washing operations unless required. If required, extreme care shall be exercised to protect personnel from falling. Protective systems such as safety lines, and safety belts shall be utilized. Long handled brushes will be used to aid in cleaning those aircraft areas which are difficult to reach.
4. Supervisors and personnel using work stands shall ensure that the guardrails are in place. Stands and rails shall be maintained in good condition and stands will be secured against accidental movement while personnel are on them. Extreme caution shall be exercised to avoid slipping or falling from work stands. Personal protection equipment and clothing shall be used.
5. Aircraft washing shall be performed only at the authorized aircraft washing area located on the west ramp adjacent to hangar D-1.

3.2 Records and Reports

3.2.1 Records

The Aircraft Services Contractor (ASC) shall maintain a record of all visiting aircraft services that reflects date, time, aircraft number, project name, and service performed. The purpose of this record is to document activity and charges.

A Hold-Off Tag (also referred to as a Danger Tag) is used to identify an “unsafe to operate” condition that could result in damage to equipment or personal injury if the subject equipment were operated. The Hold-Off Tag is red in color to readily identify unsafe-to-operate equipment and/or related systems. The Hold-Off Tag shall be utilized for all “unsafe-to-operate conditions” either on aircraft, maintenance support equipment, and or systems.

3.2.2 Reports

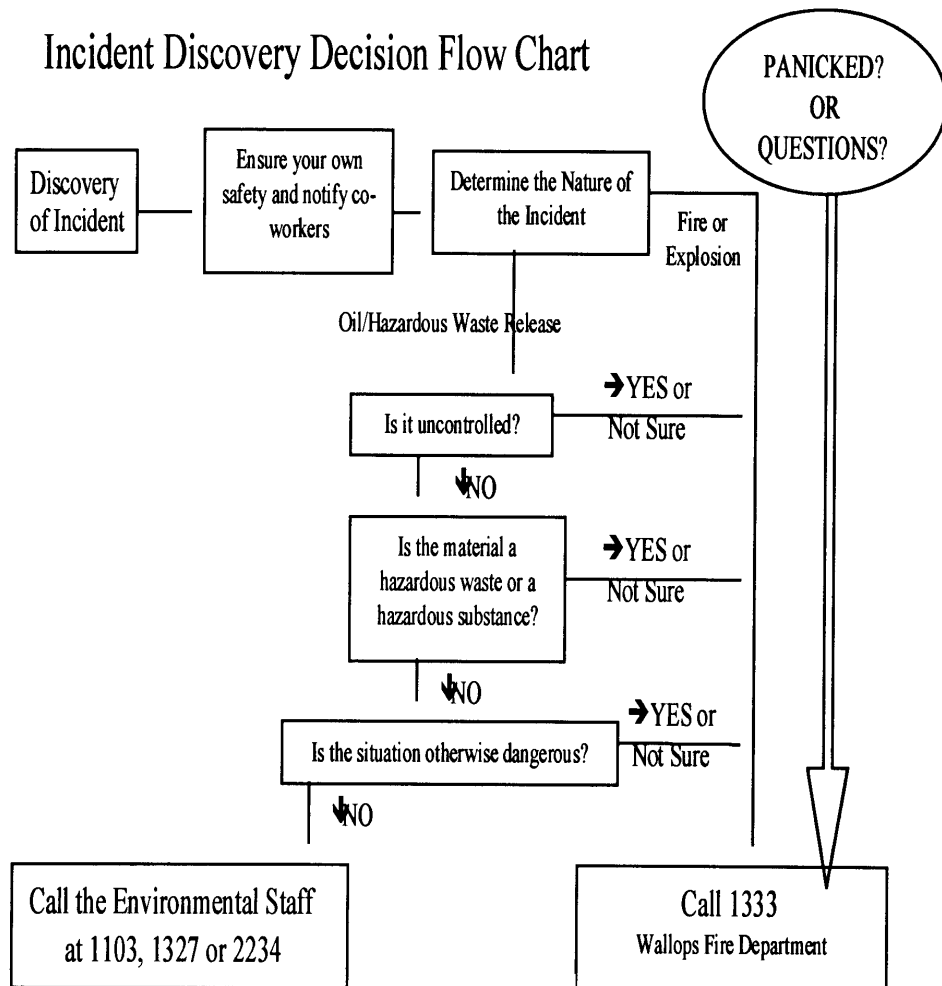
The ASC shall provide a written report of activity contained in Paragraph 3.2.1 on a monthly basis to the QAE-Maintenance.

The ASC shall report deficiencies, complaints or safety-related problems associated with line services to the QAE-Maintenance upon their occurrence.

Section Three

Appendix 3A:

Environmental Emergency Contacts



Section Four

Aircraft Ground Support Equipment (AGSE)

4.4.1 Policy

AGSE assigned to the Aircraft Office in support of local and visiting aircraft shall be operated and maintained in accordance with the general requirements and standards specified in this Section.

4.2 Operation of AGSE

The safe and proper operation of AGSE is the responsibility of the aircraft services contractor (ASC). Operation of equipment shall conform with rules and regulations on use of Government vehicles, including training certification requirements. Refer to operational standards in Section 3, Hangar and Flight Line Operations and airport requirements contained in the WFF Airport Operations Manual.

4.3 Maintenance of AGSE

4.3.1 Powered AGSE

The ASC is responsible for performing pre-operational inspections, servicing, and preventative maintenance of powered AGSE. Deficiencies not repairable by the ASC shall be reported to the QAE-Maintenance and the motor vehicle garage.

4.3.2 Non-Powered AGSE

Non-powered AGSE is inspected, serviced, and maintained by the ASC. AGSE that requires maintenance beyond the ASC capability shall be brought to the attention of the QAE-Maintenance. The ASC shall ensure compliance with “prior-to-use” inspections and periodic inspections.

4.4 Quality Assurance and Accountability

The ASC shall provide quality assurance and accountability of all AGSE that is assigned to the contractor. Accountability shall include a computer based real-time listing of all assigned AGSE with a condition status of each that is available to both the contractor and the Government. Recommendations for disposal, replacement or addition of AGSE shall be submitted to the QAE for Maintenance.

4.5 Records and Reports

Records and reports will be distributed according to the following schedule:

1. Monthly AGSE condition status reports (Form WI-28) of powered and non-powered equipment shall be submitted by the ASC to the QAE-Maintenance at the end of each month.
2. Semi-annual inventory reports of GFP/GFE are required by NHB 4100.1. These reports shall be submitted to the QAE-Maintenance on May 1 and November 1 of each year.
3. Deficiency reports shall be submitted by the ASC to the QAE-Maintenance. When there is missing or damaged GFP/GFE (powered or non-powered AGSE). Details of the deficiency including cause and effect shall be included in the reports.
4. Inspection and maintenance records of AGSE are required to document scheduled and unscheduled maintenance as well as forthcoming inspection requirements. These records as a minimum, will list the type of equipment, identification numbers, inspection schedule, inspection results, discrepancies, repairs and operational status using standard maintenance symbology.

Section Five Aircraft Life Support Equipment (ALSE)

5.1 Policy

ALSE is to be maintained and handled with the highest level of care so as to ensure its functionality, when needed. ALSE including flight clothing shall only be used for official purposes and when engaged in flight operations.

5.2 Requirements and Standards

5.2.1 General

The ASC shall operate an ALSE Shop for the storage, maintenance, repair and issuance of ALSE. This shop shall conform with manufacturer's specifications, military standards and FAA requirements, as applicable, relative to cleanliness, orderliness, and maintenance procedures. The ALSE Shop shall be subject to quality assurance inspections.

5.2.2 ALSE

Test, inspect, and repair ALSE within shop capability. Arrange for out-of-shop repairs as authorized by the Government (QAE-Maintenance). The following inspection schedule is required:

<u>ALSE</u>	<u>Period (days)</u>
*Parachutes	120
Emergency Signal Kits	180
First Aid Kits	180
Oxygen/Smoke Protection Units	180
Fire Extinguishers	180
Flotation Vests	180
Flotation Rafts	180
Pneumatic Escape Slides	360
Anti Exposure Suits/Arctic Attire	360

*Parachutes are not normally required for GSFC/WFF operations. When required, parachutes are obtained from or inspected at other ALSE facilities.

ALSE is inspected to manufacturer specifications by the ASC. Nonconforming ALSE is tagged with a Parts Control Tag and precluded from use. Conforming ALSE is identified in the computer database, which contains the inspection schedule and location. The database is a quality record. The ALSE specialist controls this process.

5.2.3 Issuance of ALSE

The ASC is responsible for the custodial management and issuance of flight clothing and equipment to flight and project personnel as authorized by QAE-Maintenance. The ASC assists personnel with equipment functional demonstrations, technical information, and fitting; and maintains signed custody forms for all issuances to flight personnel. These forms are retained while equipment is in a subcustody status. Duration of issuance shall be determined by the contract manager and Government QAE personnel. Government furnished property (GFP) and equipment (GFE) shall be promptly returned to the ALSE Shop for turn-in upon termination of need or employment.

GFP and GFE that are lost or damaged through carelessness shall be subject to replacement by responsible parties.

5.2.4 ALSE Aircraft Assignments

ALSE shall be located or assigned aircraft as follows:

1. First Aid Kits. One (1) prominently located kit shall be aboard each small or medium aircraft. Two (2) kits shall be aboard each large aircraft.
2. Emergency Signal Kits. One (1) prominently located kit shall be aboard each small or medium aircraft. Two (2) kits shall be aboard large aircraft.
3. Crash Axe and Gloves. One (1) prominently located crash axe and holder shall be aboard each small or medium aircraft. Two (2) such units shall be installed in large aircraft. Protective gloves shall be located with each crash axe.
4. Flotation Vests. One (1) vest per aircraft occupant shall be located at each occupant's seat plus 10% reserve.

5. Flotation Rafts. All flights operating over water more than 50 miles from land shall carry flotation rafts and associated accessory kits adequate to accommodate all on board personnel.
6. Anti-Exposure (A-E) Suits. A-E suits may be required for selected over-water missions as described in specific mission directives. These suits shall be maintained in the ALSE Shop and placed aboard aircraft as required.
7. Fire Extinguishers. Portable fire extinguisher units shall be located aboard aircraft in conformance with their respective flight manual locations. Fire extinguisher servicing and testing shall be coordinated with the Wallops Fire Department.
8. Oxygen Systems. Each aircraft occupant shall have ready access to oxygen. Oxygen use shall be from an integral aircraft system, portable oxygen bottle or portable oxygen hood depending upon the particular aircraft. Oxygen provisioning shall be in conformance with each aircraft's official flight manual and associated supplement.
9. Pneumatic Escape slides (PES). A PES shall be installed on the P-3 aircraft at the main cabin door as a general policy when cabin occupancy exceeds 10 or at other times when additional evacuation capacity is needed.

NOTE (1) ALSE may be removed from aircraft that are in maintenance, modification, or reconfiguration status, however, a maintenance logbook entry is required upon removal and reassignment.

- (2) Arctic survival attire and equipment shall be assigned to aircraft missions requiring Arctic environmental protection as determined by mission requirements.

5.2.5 Records and Reports

The following ALSE reports and records are required:

1. Semi-annual inventory reports of GFP and GFE are required by NHB 4100.1. These reports shall be submitted to the QAE-Maintenance on May 1 and November 1 of each year.

2. Deficiency reports shall be submitted to the QAE-Maintenance when there is missing or damaged GFE/GFP requiring out-of-shop repair. Deficiency reports shall detail cause and effect of deficiency.
3. Procurement recommendations shall be submitted by the ASC to the QAE-Maintenance when new or replacement ALSE is needed.

The ALSE Shop shall maintain the following records that are available for QAE inspection:

1. ALSE Inspection and Testing Record
2. ALSE Issue/Return Custody Record

Section Six Avionics

6.1 Purpose

This section describes policy, requirements, processes, and standards associated with the Avionics Shop.

6.2 Scope

The work performed by the Avionics Shop is limited to that which is in direct support of assigned aircraft and programs. This work includes aircraft electronic troubleshooting, testing, repair or replacement of parts, circuit design, and installation of program support aircraft modifications, as well as operation and maintenance of an electrical battery shop.

6.3 Policy

The Avionics Shop shall be operated and maintained for official use only and be in compliance with ISO procedures. Only authorized ASC personnel shall work in the Avionics Shop. Adherence to IMTE and tool control procedures described in this Manual is required.

6.3.1 Equipment

Avionics equipment assigned to the shop includes various meters, analyzers, counters, oscilloscopes, power supplies, test sets, generators, chargers, converters, special tools, and supplies. This Government-furnished equipment is provided through subcustody to the ASC.

6.3.2 Requirements

The following requirements are considered typical of those performed by the Avionics Shop:

- Equipment troubleshooting and testing
- Repair or replacement of avionics equipment
- Maintenance of NiCad batteries
- Design of electrical circuits
- Installation of modified or upgraded electrical and avionics wiring or equipment in program support aircraft

- Assisting project personnel with project equipment installations and inspect such equipment relative to airworthiness
- Performing in-flight avionics support on program support aircraft, as required

6.4 Processes and Procedures

Work requirements are forwarded to the Avionics Shop from the ASC maintenance management control office in response to the following:

1. Aircraft Maintenance Logbook discrepancies (Form 1103C) or
2. Aircraft Configuration Control (ACC), Form WI 1418, which describes and authorizes aircraft modifications
3. Battery maintenance is performed in the battery shop in accordance with a battery requirements status board maintained by the Avionics Supervisor.
4. IMTE calibrations are tracked by using the Code 803 recall system.
5. The tool control process is described in Section 2.

6.5 Standards

The work performed by the Avionics Shop is accomplished in accordance with individual aircraft maintenance manual standards. Modification work is conducted in accordance with established engineering standards (see Section 8). A battery shop standards summary is an appendix to this section.

6.6 Records and Reports

See Appendix 10B.

Section Six

Appendix 6A:

Battery Shop Requirements and Standards Summary

1. The shower and eyewash will be tested and test recorded prior to starting any work.
2. The emergency telephone will be tested prior to starting any work.
3. No unauthorized personnel will be allowed in the battery shop while work is being performed.
4. NO SMOKING in the battery shop.
5. The following specific standards will be used while working on batteries:
 - a. Marathon Instruction Manual for NICAD batteries
 - b. Saft Instruction Manual for NICAD batteries
 - c. URDC AMPS Instruction Manual (154UM107)
 - d. BF Goodrich (JET) PS-823 Maintenance Manual
 - e. Christie Operator's Manual for CASP2000
 - f. Christie Operator's Manual for RF80H
 - g. Christie Operator's Manual for RF80-K

Section Seven Fabrication

7.1 Purpose

This section describes policy, requirements, processes, and standards associated with the Fabrication Shop.

7.2 Scope

The work performed by the Fabrication Shop is limited to that which is in direct support of assigned aircraft and programs. This work includes identification of materials, as well as their storage, fabrications, and assembly used for repair or modification to aircraft and associated equipment.

7.3 Policy

The use of the Fabrication Shop is limited to the support of Code 830-approved projects. Fabrication Shop work is authorized by ASC maintenance management in response to aircraft maintenance or modification requirements. The use of the Fabrication Shop, its equipment, or materials for unauthorized work or by unauthorized personnel is strictly prohibited. To ensure quality and safety, only trained and qualified personnel shall be authorized to use Fabrication Shop equipment.

7.4 Equipment

The permanent equipment available in the Fabrication Shop include lathes, milling machines, presses, saws, brakes, and shearing machines.

7.5 Requirements

The following requirements are typical of those performed by the Fabrication Shop:

1. Replacement or repair of internal and external aircraft structure
2. Modification to aircraft structure to support project installations
3. Manufacture of project equipment racks

4. Providing assistance to engineers in the design of project equipment supports
5. Performing limited machining
6. Performing limited fiberglass repair and fabrication
7. Establishing and implementing a preventive maintenance schedule for shop equipment

7.6 Process and Procedures

Work requirements are forwarded to the Fabrication Shop from the ASC maintenance management control office in response to the following:

1. Aircraft Maintenance Logbook discrepancies (Form 1103C) or
2. Aircraft Configuration Control (ACC) Form WI-1418, which describes and authorizes aircraft modifications or
3. Other requirements

Aircraft repairs conducted in response to item 1 are performed according to aircraft design or maintenance manual criteria and specifications. Fabrication performed in response to item 2 is in accordance with approved engineering design drawings. Item 3 refers to other requirements that are not addressed in items 1 or 2 and, therefore, would require a specifically authorized work order.

7.7 Standards

The work performed by the Fabrication Shop is in conformance with specific aircraft related standards contained within related manuals. Specific operating and safety rules are posted within the shop area.

7.8 Records and Reports

See Appendix 10B.

Section Eight

Aircraft Configuration Control

8.1 Purpose

This section outlines standards, requirements, and procedures for the control of (a) aircraft modifications and (b) installation and removal of project equipment on aircraft. This section establishes a documented process for controlling the configuration of assigned aircraft and ensuring airworthiness. See flow chart entitled, “Code 830 Design Participation,” relative to paragraphs 8.4.1 through 8.4.4.

8.2 Scope

This section covers all aspects of configuration planning, commencing with first contact and ending with the final quality inspection prior to flight. These requirements apply to NASA aircraft assigned to GSFC’s WFF. This section does not cover flight testing that is specifically addressed within individual flight test operational and safety directives.

8.3 Policy

Aircraft modifications and configuration changes shall comply with NASA policy and Federal law, as applicable. All assigned aircraft are to be maintained in an airworthy condition and be capable of safely operating throughout their full flight envelopes as defined by the aircraft manufacturer, the FAA, or as redefined by a NASA airworthiness board. A NASA airworthiness review shall be conducted by the GSFC/WFF Airworthiness Review Board (ARB) whose cross-functional engineering and safety membership provides an independent, third-party perspective for all modifications to assigned program support aircraft (PSA).

8.4 Configuration Development Phase

8.4.1 First Contact with Prospective Aircraft User

During the initial meetings with a prospective aircraft user, the assigned Code 840 project manager ascertains user requirements. These requirements include a complete listing of project equipment, including spares that are intended to be aboard the aircraft. It also shall include electrical and chemical requirements that support the on-board project. Hazardous materials (HAZMAT), such as compressed gases or flammable liquids, must be identified. The project

manager alerts the GSFC/WFF ARB that an airworthiness review will be required, as applicable. Refer to pages 8A-1 and 8B-1 for process flow charts.

8.4.2 Documentation Development

The assigned Code 840 project manager shall develop an aircraft configuration layout that details the location of project components and a milestone schedule for design and fabrication. If a component can not be mounted within the aircraft's standard structure, the project engineer will draft an Engineering Change Proposal (ECP), WI Form-1544, or an equivalent document. The project engineer disseminates the ECP with supporting documents to the Aviation Safety Officer (ASO), QAE-QA, QAE-Maintenance, Chairman, ARB, and the ASC Contract Manager for review prior to aircraft modification development.

8.4.3 Configuration Process for Project Equipment (No Aircraft Modifications)

The assigned project manager shall initiate an Aircraft Configuration Control (ACC) document, WI-1418 with formal aircraft configuration drawings attached when this information is received from project personnel. The ACC document shall fully describe the equipment installation with each component and associated rack to include description nomenclature, fuselage station, location, and weights. After review and approval of the ACC document and attachments by the QAE-Maintenance and QAE-QA, it will be forwarded to the ASC for implementation unless a problem is foreseen with system interface, installation, or weight and balance.

The ASC shall fabricate, install, and inspect the installation in accordance with the ACC requirements and standards within this section as a minimum. It is a quality assurance (QA) responsibility to monitor and inspect the installation. A thorough weight and balance calculation including a complete inventory of all installed project equipment is required. After the final inspection is made and the weight and balance is completed, the ASC and NASA shall certify the aircraft to be released for flight. Refer to page 8B-1 for Fabrication and Installation Flow Chart.

8.4.4 Configuration Process for Project Equipment (With Aircraft Modifications)

All modifications to program support aircraft (PSA), except modifications performed under an FAA approval system, shall be reviewed by a NASA airworthiness review board (ARB) and, if approved, are implemented through an Aircraft Configuration Control (ACC) document. The ACC document and supporting attachments are presented to the QAE-Maintenance and QAE-QA for review and forwarding to the ASC for follow-on fabrication and installation. Engineering requirements, including design and installation drawings, are reviewed by the ARB. In some

cases, the design review process may be lessened depending upon the extent of the installation. For a description of installation with aircraft modifications, refer to paragraph 8.5.7.

8.5 Airworthiness Review Requirements

Airworthiness reviews are required for all projects that alter the aircraft structure, flying characteristics, or involve the placement of user-supplied equipment on the aircraft. In general, airworthiness review requirements are proportional and commensurate with the degree of change and level of risk involved in the modification of aircraft and their flight envelopes. At the discretion of the Chairman, Airworthiness Review Board (ARB) one or more reviews may be required. The following configuration changes and modifications are examples that require an airworthiness review:

- A. Changes in aircraft that may necessitate redefinition of an aircraft's published envelope and aerodynamic characteristics;
- B. Installations that involve mid-air separation or engagement of components by an aircraft;
- C. Installations that involve hazardous materials or;
- D. Cutouts of any size in the airframe;
- E. Airframe load path changes;
- F. Window modifications and external appendages;
- G. Installations that alter load paths within the aircraft interior.

8.5.1 Airworthiness Review Process

The review process shall be sufficient to address all aspects of an aircraft modification. Each review is presented in a sequential manner with background information presented first and then methodically moving toward a conclusion. Presentations are normally conducted in an informal and interactive setting with the presenter providing descriptive handouts, viewgraphs, or other material that is considered necessary or beneficial. The ARB is responsible for assuring that adequate coverage of airworthiness issues is addressed. The ARB chairperson is appointed by the Code 800 Director. Decisions must be unanimous.

8.5.2 Responsibility for Presentation of Airworthiness Reviews

- A. Primary responsibility for the presentation of reviews resides with the assigned project engineer. The ARB may request the assistance of specialists from other organizations to provide for a complete understanding of the review material.
- B. Presentations to the ARB shall address each item on the review outline. The depth and detail of the review will vary with the extent modification and thus, non-applicable items may be omitted.

8.5.3 Arrangement for Airworthiness Reviews

The assigned project manager or project engineer functions as an airworthiness coordinator who contacts the Chairman of the Airworthiness Review Board (ARB) with sufficient lead time to facilitate ARB arrangements.

8.5.4 Review Schedule

The review schedule must be sequenced to a point in the project when hardware designs are essentially final but prior to fabrication and installation of the modification. At this time, detailed hardware specifications are ready for review, and plans have been substantially completed. Refer to page 8A-1 for process description.

8.5.5 Review Content

A. Project Overview

- (1) Project Description – A brief background review of project objectives, requirements, plans, and design rationale.
- (2) Project and Schedule Milestones – Schedule of major project events in the design and fabrication process.
- (3) Current Status – Update on existing status, including remaining actions and revised schedule.

B. Airworthiness Determination

(1) Analyses

- (a) Engineering Analyses – Engineering design analyses of aircraft modifications and project hardware installations.
- (b) Failure Mode, Effects, and Criticality Analysis (FMECA) – A systematic evaluation of aircraft responses to malfunctions in project hardware, made at the system and subsystem levels
- (c) Aircraft Operating Analysis – An analysis of the instrumentation, displays, and flight controls that are unique to the project or that must interface with project hardware.
- (d) Safety Analysis – A safety analysis that includes hazard identification and risk assessment.

(2) Pilot Evaluation

- (a) Displays, Monitors, Warning Devices – Pilot assessment on adequacy of display and safety monitoring features.
 - (b) Aircraft Operation – Pilot evaluation of estimated aircraft performance and handling characteristics, including response to off-nominal and failure conditions.
- (3) Quality Assurance Plan – Presentation of inspection, configuration control, non-conformance and corrective action plans to be used.
- (4) Maintenance Support Plan – Procedures for preventive and corrective maintenance of project hardware during the flight phase.

C. Review Summary

- (1) Identification of Open Items – Status of all action items.
- (2) Action Item Assignment – Assignments made by the ARB to its own members or to project personnel. Establish milestones for next review.

8.5.6 ARB Documentation

Detailed documentation of ARB activity shall be maintained by the chairman. Summary information with supporting enclosures of each ARB action shall be addressed to Chief, Aircraft Office (Code 830). This summary shall include (a) Board member participation; (b) material reviewed, (c) status of review; (d) release for flight signed by the Chairman as applicable.

8.6 Installation Phase

The ASC shall install and inspect the installation in accordance with the ACC requirements and standards within this section as a minimum. It is a QA responsibility to monitor and inspect the installation. A thorough weight and balance calculation, including a complete inventory of all installed project equipment, is required. After the final inspection is made and the weight and balance is completed, the ASC and NASA shall certify the aircraft to be released for flight per Form WI-1103B.

8.6.1 Configuration Control Requirements and Standards

A. Summary Level Documentation

Summary documentation defines aircraft installations at the component level and provides a comprehensive picture of the aircraft configuration. It consists of:

- (1) A detailed project component inventory, which is initiated by the assigned Project Engineer and verified by QA prior to installation of the equipment. The component inventory is documented on the Aircraft Configuration Control Form, Part 4, Component Listing. Derivatives of this form include the assembly level inventories and weight and balance records. Pertinent information will be extracted from the component listing for aircraft configuration and weight and balance calculation.

- (2) The aircraft mission OSD provides information on summary-level documentation.
- (3) The GSFC/WFF “Aircraft Users Guide” describes the standard aircraft facilities for each aircraft, as well as policy and requirements for the acceptance and handling of user equipment aboard aircraft. This information is also available by computer on the Aircraft Office home page. Project managers will maintain, update, and distribute this information to the user community.

B. Technical Level Documentation

Technical-level documentation shall be maintained as quality records in the Aircraft Project Engineering Office and the QA Office. A file shall be maintained for each aircraft containing: (1) a completed Engineering Change Proposal (2) engineering drawings (3) experimental tests documentation (4) documentation from airworthiness certification (5) a copy of the completed Aircraft Configuration Change document (6) other supporting documents. The folder shall be indexed by (1) aircraft (2) date and (3) installation name.

C. Engineering Standards

Engineering standards and references are described in this section. They consist of standard documents such as (1) FAA AC 43-13; (2) design and operation manuals for each aircraft, and (3) engineering tests. This data is maintained and available at both the engineering and maintenance offices.

8.6.2 General Installation Standards

A. Introduction

No installation is permitted which, without prior review, would limit the flight envelope of aircraft or impair or limit the operation of aircraft systems. Specifically, installations shall not interfere with:

- (1) escape hatches, entrance doors, and droppable stores;

- (2) power plants and control surfaces, including cabling and respective manipulative controls (by fouling or by aerodynamic blanking);
- (3) pilot instrumentation (unless review permits a deviation), duplicate or compensating instrumentation on the co-pilot's panel in addition to any other associated requirements.

B. Structural Mounting

- (1) Structural components shall be located so as to minimize adverse affects to on-board personnel in the event of crash or emergency exist. All non-fixed components are to be secured during takeoff, landing, and periods of turbulence.

When undersurface mounting is not possible, elastic plate nuts may be used. Self-tapping screws shall not be used for installation of project components and electrical connections. Aircraft structural fasteners (MS, NAS, or the equivalent) shall be used, with preference shown for elastic stopnuts. For improved alignment accuracy with aircraft framing, component drilling by on-site personnel is preferred to off-site drilling.

- (2) Installation mountings and supporting members (beams, racks, tables, clamps, fasteners) shall possess adequate strength to withstand aerodynamic and acceleration loads throughout the aircraft's operating envelope to include landing and crash loads. Installations must be capable of withstanding the static ultimate acceleration loads in the following table without incurring deformation:

<u>Load Direction</u>	<u>Cabin Load Factor (G)</u>	<u>Other Area Load Factor (G)</u>
Fwd	10.0*	1.5
Aft	1.5	1.5
Up	2.0	2.0
Down	7.0	7.0
Side	1.5	1.5

*15.0 for military aircraft.

Installations that are subject to the air stream must be able to react to the sum of the above acceleration loads plus the aerodynamic lift and drag loads imposed on it.

As an alternative, dynamic acceleration loads must withstand: (1) a forward 30 g 11 m.s. crash pulse, and (2) ground-roll vibratory inputs of $+1/2$ g at Hz and below. For transport category aircraft, a 16 g dynamic pulse load is required by the FAA.

C. Electrical Mounting

- (1) Wiring is to be of certified commercial-grade quality for aircraft avionics with a grounding lead. Wiring and cabling will be protected from overload by a fuse or circuit breaker. It will be clamped and tied to prevent movement during maneuvering. All wiring will be properly identified.
- (2) Power is to be taken at a supply point through a screw type connector. Drop cords to convey power to another location are prohibited. Power Receptacles are to be positioned so as to minimize shorting by accidental spillage of liquids.
- (3) Covers will be provided over the following: (a) sources of arcing; (b) high voltage components, and (c) high heat components. The covers will provide adequate protection against (a) contact by personnel, and (b) shorting from accidental spillage of liquids.
- (4) Aircraft power sources will be wired so that all can shut down immediately on order of the pilot in command, as by a “test-table switch.” Circuit breakers will protect the aircraft line systems from overload by installation overloads. All distribution points will provide positive ground to the airframe, and groundwire connection to the airframe for installations operating from it.

8.7 **References and Sources**

A. FAA Advisory Circular AC 43.13-1A

Chapter #2, Aircraft Metal Structures

Chapter #5, Aircraft Hardware

Chapter #11, Electrical Systems
Chapter #13, Weight and Balance
Chapter #15, Radio and Electronic Systems
Chapter #16, Instruments

B. FAA Advisory Circular AC 43.13-2B

Chapter #1, Structural Data
Chapter #2, Radio Installations
Chapter #3, Antenna Installations
Chapter #6, Rotorcraft External-load Devices Instruction
Chapter #11, Adding or Relocating Instruments
Chapter #12, Litter, Berth and Cargo Tiedown Device Installations
Chapter #13, Penetration through Pressurized Structure

C. USAF Technical Orders

T.O. 1-1A-8, Aircraft and Missile Structural Hardware
T.O. 1C-1-71, Aircraft Cargo Tiedown Equipment
T.O. 42B5-1-2, Gas Cylinder Use, Handling and Maintenance

D. U.S. Navy Technical Orders

NAVAIR 01-1A-17, Aviation Hydraulic Manual
NAVAIR 01-1A-20, Aviation Hose and Tube Manual
NAVAIR 01-1A-505, Electrical Wiring

E. Additional Reference Publications

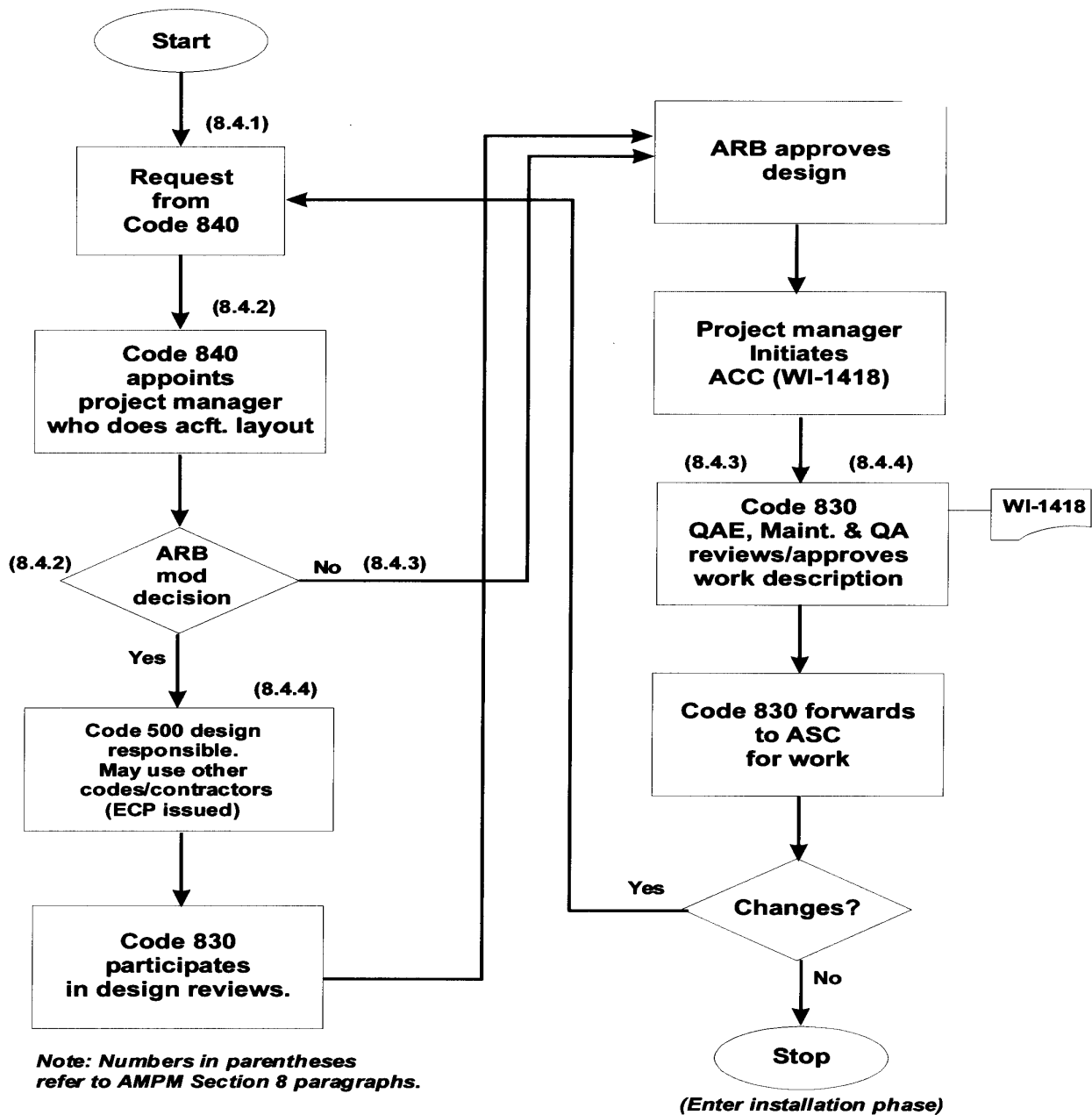
- (1) The aircraft flight manual applicable to the aircraft.
- (2) Maintenance instructions, including service bulletins, airworthiness directives, applicable to the aircraft.
- (3) Aircraft design manuals.
- (4) GPG 8700.1-.4, Design Control (ISO 9001, para. 4.4.3 and 4.4.4 only)
- (5) GPG 5310.4, Product Identification and Traceability

- (6) GPG 8072.1-.2, Process Control
- (7) GPG 4520.2, Receiving, Inspection, Testing
- (8) GPG 5330, Inspection and Test Status
- (9) GPG 5340.2-.3, Nonconforming Products
- (10) GPG 1710.1, Corrective Action
- (11) GPG 6400, Handling, Storage, Packaging, Delivery
- (12) GPG 1410.1, Directives and Documentation Management

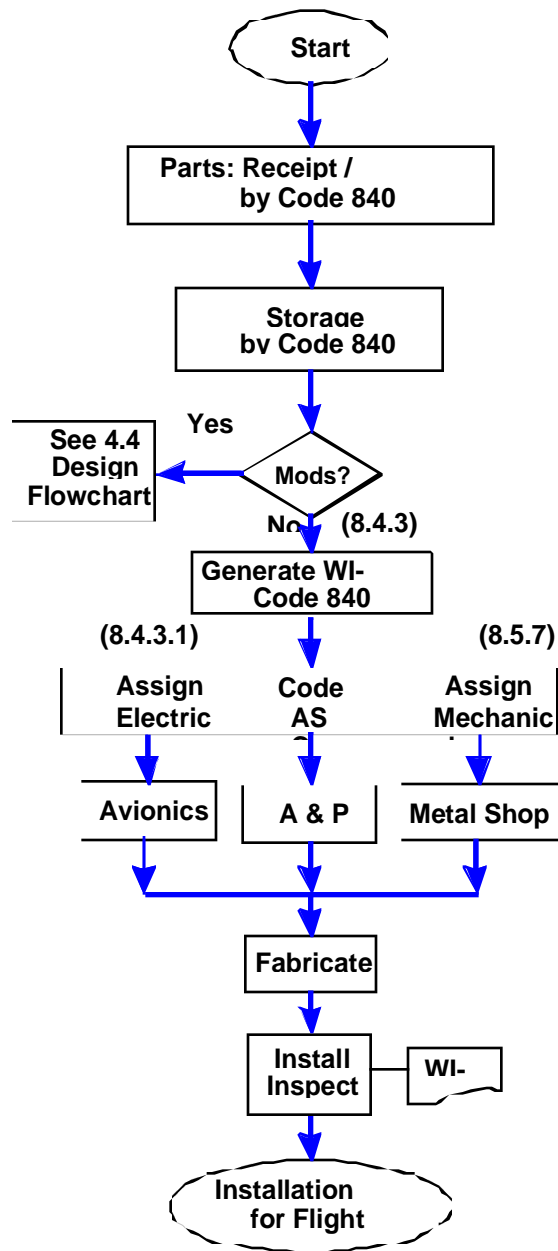
8.8 Records and Reports

Refer to Appendix 10B.

Section Eight
Appendix 8A:
Code 830 – Design Participation
(ISO Elements 4.4.3 and 4.4.9)



Section Eight
Appendix 8B:
Code 830 – Fabrication and Installation
(ISO Element 4. 9)



Section Nine

Material Management

9.1 General Policy

Material procurement, handling, storage, packaging, delivery, and issuance shall be conducted in accordance with a quality management system that ensures compliance with Federal Acquisitions Regulations (FAR), the NASA FAR Supplement (NFS), NASA Materials Inventory Management Policy (NHB 4100.1) and other applicable regulations. NASA will only acquire materials for mission performance and official purposes. Materials will be controlled and accounted for in accordance with provisions contained in NHB 4100.1 and GPG 5100.1.

9.2 Responsibility

The Chief, Aircraft Office, and the Aircraft Maintenance Manager are responsible for procurement related to assigned aircraft, equipment, furnishings, and services. The aircraft services contractor (ASC) is responsible for those procurement functions and activities that are under contract.

9.3 References

- a. Federal Acquisition Regulations (FAR)
- b. NASA Federal Acquisition Regulation Supplement (NFS)
- c. NASA Procurement Notices
- d. Federal Property Management Regulations (FPMR)
- e. NASA Materials Inventory Management Manual (NHB 4100.1c)
- f. NASA Equipment Management Manual (NHB 4200.1)
- g. NASA Personal Property Disposal Manual (NHB 4300.1)
- h. GSFC Small Purchase System (SPS) Handbook

- i. GSFC Credit Card Purchasers Handbook
- j. GPG 4520.1-2, Receiving, Incoming Inspection and Testing (RITS)
- k. GPG 5100.1, .2, Procurement; Purchasing and Supplier Performance Records
- l. GPG 5310.4, Product Identification and Traceability
- m. GPG 5330, Inspection and Test Status
- n. GPG 5340.2, Control of Nonconforming Products
- o. GPG 6400, Handling, Storage, Packaging, and Delivery

9.4 Material Procurement

The procurement of supplies, parts, and materials in support of Aircraft Office functions are normally obtained through the following source categories:

9.4.1 Stores Stock (Status Code 1)

Materials in inventory at WFF which are repeatedly procured, stored, and issued on the basis of recurring demand. The NASA Small Purchase System (SPS) or NASA Form WI-929 is used for store stock requisitioning.

9.4.2 Program Stock (Status Code 2)

Program stock is material acquired by direct purchase or by issue from stores stock for a specific program or project. Material for program support aircraft are normally acquired through this code using the NASA SPS or Form WI-1472.

9.4.3 Standby Stock (Status Code 3)

Material held for emergencies for which there is no normal recurring demand but which must be immediately available to preclude interruption of operations. The NASA SPS or Form WI-929 is used for standby stock requisitioning.

9.4.4 FEDSTRIP

For material not in stores stock but available through federal supply sources such as the General Services Administration (GSA), procurement via FEDSTRIP is performed. GSA Form 1348 is utilized for FEDSTRIP procurements.

9.4.5 MILSTRIP

For material requirements that fall within the Defense Logistics Agency (DLA) or military department supply systems, MILSTRIP procurements are normally used. These procurements usually relate to former military equipment used by NASA. GSA Form 1348 is normally used for MILSTRIP procurements.

9.4.6 Open Purchase

Material that is not available from Government sources may be procured through open purchase from commercial vendors. Such purchases must be in compliance with applicable Government regulations and GPG 5100.1.

9.5 Shipping, Traceability, Receiving, Inspection, and Testing

The shipping and receiving of material at GSFC's WFF is normally conducted through the Code 233 Shipping and Receiving Office procedures. When inspection is performed by Code 830, it is to the purchase order requirements. Items are also examined for in-transit damage. Acceptable items receive a "Serviceable" tag. Unacceptable items receive a Red Tag. GSFC Form 20-4, Invoice Shipping Document, is used and initiated by material procurement personnel for out shipments.

9.6 Services Procurement

Procurement of aircraft services such as aircraft inspections and engine overhauls that are beyond in-house capability are normally performed on an individual basis using existing Government contracts where available. At the discretion of the Government, these service-related procurements may be requested through the ASC.

9.7 Handling and Storage of Material

The aircraft maintenance stockroom and associated storage areas is the focal point for the receipt, stockage, and issuance of assigned aircraft related parts, supplies, and material. Control, accountability, and security of these facilities is of paramount importance. NHB 4100.1, NASA

Materials Inventory Management Manual contains NASA policy and procedures on material inventory management. The ASC maintains and manages stockroom and storage functions.

9.8 Records and Reports

9.8.1 Monthly Contractor Procurement Activity Report

This report lists direct purchases by the contractor and is provided to the QAE-Maintenance at the end of each month. The report contains a line item for each purchase with a date, description of purchase, source of purchase, and amount of item.

9.8.2 Inventory Reports and Forms

Inventory reports of stock shall be made in compliance with the NHB 4100.1C, Materials Inventory and Management Manual.

9.8.3 Procurement Deficiency/Variance Reports

Deficiency/variance reports detail procurement-related abnormalities. These reports are normally initiated by the ASC or by others who witness a procurement abnormality. The report is submitted to the NASA QAE-Operations or QAE-Maintenance, as applicable, who, in turn, reports to the Chief of the Aircraft Office. The applicable QAE uses the report in compliance with GPG 5100.2. The report is a quality record.

9.8.4 Parts Control Tags (Form WI-1126)

The parts control tag is used to identify maintenance parts and material when not actually installed on an aircraft.

9.8.5 Serviceable Tag (Form WI-1127)

The serviceable tag is used to identify parts and/or units that have been repaired and returned to serviceable condition by the ASC maintenance activity. This tag shall be used in conjunction with the WI-1126 Parts Control Tag.

9.8.6 Maintenance Cannibalization Request/Action Form (Form WI-1536)

Form WI-1536 is used to identify and record the removal of components and parts from one aircraft to another to replace a defective part with an identified operable part.

Section Ten

Part I:

Aircraft Records, Logs and Documentation

10.1 General Administrative Requirements

10.1.1 Introduction

This section prescribes requirements for the administration of maintenance documents. Filing, disposition, and documentation of records are addressed. Specific instructions pertaining to form entries are covered in subsequent parts of this section.

10.1.2 Quality of Print

All entries on maintenance documents, with the exception of signatures or stamps, shall be typed or printed. Signatures shall be typed or printed if transcribed by an individual other than the original signer. The handwritten entries on maintenance documents shall be made with black ink (ball point pen), unless otherwise specified. The minimum signature for maintenance personnel certifying entries on forms governed by this manual shall be first name initial, last name, and employee number. (The last four digits of the individual's social security number shall be used as an employee number.) Maintenance documents shall be legible, complete, correct, and clean.

10.1.3 Filing Requirements

An historical file shall be maintained for each aircraft and unit of ground support equipment (GSE) under an ASC quality assurance management system. See Appendix 10B.

10.1.3.1

Historical document files for components and subsystems may be included within equipment-end-item files or may be maintained in separate files. Files for GSE shall be maintained in a separate folder or series of folders. Each file shall contain historical information or operational data, maintenance records and reports that reflect current status.

10.1.3.2

Examples of documents and records that require historical filing:

- (1) WI 1103 Forms
- (2) Records on airframes, engines, propellers, time components, and GSE
- (3) Incorporation of airworthiness directives, technical orders, service bulletins, and related instructions.
- (4) Aircraft modifications work
- (5) Completed maintenance work.
- (6) Nondestructive inspection (NDI) documents and reports
- (7) Functional check flight results.
- (8) Automated and computer based products
- (9) Completed inspections

10.1.4 Maintenance Forms Summary of Documents

Disposition, description, and purpose of maintenance related documents shall be in accordance with the Maintenance Forms Summary in Appendix 10B.

10.1.5 Maintenance of Documents During Extended Storage of Aircraft, Engines, or Equipment

Documents for aircraft, engines, and/or equipment in extended storage shall be in accordance with directions published within this section.

10.1.5.1

When aircraft, engines, or equipment are removed from storage, their records shall be reviewed to ensure that they are complete and accurate, and that all outstanding relevant technical directives are listed on the applicable forms for follow-up action.

10.1.5.2

When aircraft, engines, or equipment are maintained in flyable storage at WFF, maintenance requirements may be modified if necessary with the approval of the NASA Aircraft Maintenance Manager. Aircraft power plants mounted aboard aircraft that are not in a preserved state shall be ground run on a 30-day basis. The ASC must request a waiver for any noncompliance. When maintenance or inspections are performed during the storage period, such documentation shall be

recorded on applicable forms for that item. Although items are in storage, all documents must be accurate, complete and maintained in properly established files.

10.1.6 Standardized Date Entries

Record all dates on the forms prescribed in this manual by digits in the order of month, day, and year. Example: 8/12/95 for Aug. 12, 1995.

Part II: Symbology Description

10.2.1 Introduction

The symbols described in this Part are established for use on maintenance documents to ensure that important notations are instantly apparent. Symbols indicate the condition, flight readiness and status of operation, servicing, inspection, and maintenance of aircraft or support equipment units. These symbols and their use must be fully understood in order to make proper entries on maintenance documents.

- A. Symbols shall be entered in red to indicate importance and warning. The Red X represents the most serious condition while the Red Dash is the next most serious, and the Red Diagonal the least serious condition.
- B. More specific applications of symbols are contained in the following instructions for completing maintenance documents.

10.2.2 Red X

A Red X indicates that the aircraft, support system, publication, or equipment is missing or considered unsafe for flight. Use of aircraft, support systems, or equipment with a Red X designation shall not occur until the unsatisfactory condition is corrected or the symbol is cleared.

- A. The restriction for operational use of the equipment does not apply to maintenance activity required in troubleshooting and repair of equipment.
- B. A Red X shall be used to “ground” or remove equipment from service. An Immediate Action technical directive or an Urgent Action directive within specified time limits are examples of symbol use.
- C. When a Red X is applied, all related work, inspection, and review must be accomplished by maintenance and QA personnel authorized to clear the Red X symbol.
- D. No one shall authorize or direct an aircraft to be flown or equipment to be used until a Red X has been properly cleared.

- E. The Red X symbol is mandatory for time change items.
- F. Repairs or work to remedy conditions indicated by a Red X symbol shall be inspected by maintenance personnel who are delegated such authority. When an aircraft, support system, or unit of equipment is in an unsafe condition and a depot facility or contractor is providing corrective action for the particular discrepancy, the inspection of work and the clearing of the Red X shall be accomplished by the depot personnel or contractor. The inspection of work performed to clear the Red X shall be accomplished before initials are placed over the symbol. This is required to ensure that the work has been properly accomplished and that nothing has been overlooked. When the work is found to be satisfactory, inspectors or supervisors shall enter their signature in the Inspected By block; their employee number in the Employee No. block, and their last-name initial over the symbol. Special procedures for clearing Red X symbols are described in the following paragraphs:
- (1) Supervisors (personnel who participate in accomplishment of the repair work and are authorized to clear Red X symbols) may enter their signature in the Inspected By block provided that another member of the maintenance crew accomplishing the work signs the Corrected By block. Work accomplished by supervisors without the assistance of another individual requires a sign-off by another supervisor or inspector.
 - (2) When operations are conducted at locations where qualified maintenance personnel are not available, the flight engineer or a dispatched qualified maintenance technician from WFF or a pilot-in-command may clear Red X symbols when specific authorization is granted by the ASC. When one of these personnel are authorized, that individual may accomplish the required work and clear the Red X by entering their signature on the Corrected By block, initialing the Inspected By block, entering their employee number in the Employee No. block, and placing the last name initial over the symbol. A Maintenance Release of Aircraft for Flight and a Pilot's Acceptance of Aircraft for Flight signature is required after the repairs are accomplished and the Red X is cleared.
 - (3) When an Immediate or Urgent Action Technical Directive or Special Inspection prescribes "INSPECTION ONLY," and the inspection is accomplished by an inspector or supervisor designated to clear Red X symbols, the symbol may be

cleared by the inspector or supervisor by entering their signature in the Inspected By block, Employee No. in the Employee No. block, and their last name initial over the symbol.

- (4) When an aircraft, support system, or unit of equipment is placed in a Red X status for the accomplishment of a scheduled inspection, the Red X shall be cleared as follows: a supervisor, a designated representative, or personnel authorized to clear the Red X shall enter a statement in the Corrective Action block indicating that the required inspection has been accomplished in accordance with the applicable requirement (CAMPS, Tech Order, Etc.); enter signature in the Inspected By block; enter employee number in the Employee No. block, and place their last name initial over the symbol. This entry will indicate that the individual has reviewed all applicable maintenance documents and the inspection requirements contained in the scheduled inspection and requirements manual have been accomplished. If there is remaining inspection work that is not of a Red X Status, which might involve the waiting for parts, the work could be transferred to the WI Form 1103C on a Red Dash.

10.2.3 Red Dash

- A. A Red Dash indicates that a required special inspection, accessory replacement, operational check, or functional check flight is due. A Red Dash also indicates that a scheduled inspection (preflight, postflight, BPO, etc.) is due. The presence of the symbol indicates that the condition of the equipment is unknown and that a more serious condition may exist. This condition shall be corrected when due unless a waiver is granted by the NASA Aircraft Maintenance Manager. Reasons for a waiver may include nonavailability of aircraft due to depot level maintenance or project integration. Depending on the nature of the inspection, it shall be accomplished prior to flight.
- B. Time change items which are continued to their scheduled replacement time may be carried on a Red Dash Symbol until expiration of the items replacement time at which time the Red Dash is changed to a Red X symbol.

10.2.4 Red Diagonal

The Red Diagonal indicates that a discrepancy exists on an aircraft or unit of equipment; but it is not sufficiently serious to warrant grounding of the aircraft or discontinuing the use of the

equipment. The Red Diagonal symbol is a straight line from the lower left to the upper right corner of the symbol block. When maintenance personnel discover an unsatisfactory condition that warrants a Red Diagonal Symbol, a description of the condition shall be described in the discrepancy block. This documentation is necessary to reflect a complete history of the work to be accomplished and to keep the aircraft, support system, and unit of equipment in an operational condition.

- A. A Red Diagonal shall be entered in the maintenance discrepancy block upon receipt of an Urgent Action and/or a Routine Action Technical Directive that does not require immediate incorporation.
- B. Routine Action Technical Directives that affect operational performance, operating limitations, or procedures shall be individually listed in maintenance records by the applicable technical directive number.

10.2.5 Clearing Red Symbol Entries

The initials entered in the symbol block of the maintenance record indicates that the individual whose name appears in a signature block has accomplished the required maintenance or has inspected the work and has found the condition satisfactory. When the initials are entered, the particular discrepancy is considered to be cleared. Any individual who signs off a red symbol for a specific maintenance task must be familiar with the technical manuals applicable to the task.

10.2.6 Changing Symbols After an Original Entry

Entry of a Red X or Red Diagonal symbol on a maintenance document by an individual represents their understanding and interpretation as to the seriousness of the defect. Therefore, no individual shall be directed to change a symbol which has been entered.

- A. If an individual of higher authority within the maintenance activity believes, that the condition is more serious than represented by the symbol, they will change the symbol themselves, draw a line through the name of the individual who made the entry and enter their signature and employee number, above or beside the signature block.
- B. If supervisory personnel believe that the condition is less serious than represented by the symbol, the matter shall be brought to the attention of the contractor's maintenance supervisor or another official who has been specifically authorized to downgrade red symbol entries. If a decision is made to downgrade the symbol, the individual who

made the decision shall indicate their action by a notation in the Corrective Action block for the particular defect. This entry shall essentially read as follows: "Symbol downgraded from a Red X to a Red Diagonal; Reentered, page (No.), item (No.)." Individuals who take such action shall assume responsibility by initialing over the symbol and entering their signature and employee number in the Inspected By block. In follow up, the same discrepancy entry with the new symbol, and the printed first initial, last name, and employee number of the person originally discovering the discrepancy shall be reentered in the next open block of the applicable form and shall include an entry to read essentially as follows: "Symbol changed from a Red X to a Red Diagonal on (date) by (employee signature and employee number)." This entry shall remain with the discrepancy until it is corrected.

- C. An aircraft with a Red X condition may be released for a one-time flight to a repair facility provided the aircraft is airworthy for the specified operating conditions. Such action must be approved by the ASC and the NASA Aircraft Maintenance Manager. If the aircraft is located at a deployed location the assigned Flight Engineer and pilot-in-command shall coordinate with the ASC and GSFC NASA Aircraft Maintenance Manager to determine the seriousness of the Red X condition and to receive guidance on releasing or not releasing the aircraft for a one time flight to a repair facility or to home station.
- D. Symbols entered on forms shall not be erased even if entered in error. Erroneously entered symbols shall be corrected as follows:
 - (1) When a Red Dash or Red Diagonal is entered in error on a discrepancy form, the individual making the entry shall enter the following statement in the corrective action block: "Symbol entered in error - correct symbol is reentered below;" (describe discrepancy) or "Symbol entered in error, no discrepancy exists," and enter their signature in the Corrected By block with their employee number in the Employee No. block and the last name initial over the symbol. When required, the discrepancy and correct symbol shall then be reentered in the next open Discrepancy block on the form.
 - (2) If the erroneous symbol is a Red X, the individual making the entry shall enter the following statement: "Symbol entered in error," state discrepancy, and "correct symbol entered below." If authorized to clear this symbol, the person shall

complete the Inspected By block with their employee number and initial over the symbol. If not authorized to clear the symbols, they shall sign the Corrected By block, enter their employee number and the entry shall be verified by an individual authorized to clear the symbols who will then initial over the symbol and complete the Inspected By block with entry of their employee number.

- E. When a condition has been assigned a Red Diagonal and it becomes more serious after additional flights or usage, the symbol shall be upgraded and appropriately described with a remark, employee signature and employee number in the Discrepancy block, and shall be preceded by an entry date. When a Red Dash symbol for an overdue inspection or accessory replacement is upgraded to a Red X Symbol, the original Red Dash shall be closed by the remark, "Symbol changed to a Red X," in the corrective action block. The discrepancy with the Red X symbol and the page No. and item No. of the new entry shall be recorded in the Corrective Action block of the original discrepancy.

10.2.7. Technical Directive Waivers

When compliance with Immediate and Urgent Action technical directives is waived, the Red X shall be changed to a Red Dash symbol in the same manner as outlined in paragraph 8.2.6. Upon termination of the condition which required use of the waiver, the Red Dash symbol shall revert to a Red X, as outlined in paragraph 8.2.6.

10.2.8 Could Not Duplicate Discrepancy

When a discrepancy for an unsatisfactory condition can not be duplicated by maintenance personnel, the discrepancy (if entered with a Red Diagonal symbol) shall be considered for upgrade to a Red X, depending on the seriousness of the condition. A person authorized to clear Red X conditions shall verify that all efforts to duplicate the reported condition and to correct the problem have been expended to the extent that it is safe to conclude that a problem does not exist. The discrepancy shall then be signed off as required for Red X conditions with a recommendation for a FCF, as applicable.

10.2.9 Repeat Discrepancy

A discrepancy that recurs during the next flight or system operation is considered a Repeat discrepancy. When this occurs, the word "REPEAT" shall be entered in red after the discrepancy. A Red X symbol shall be considered for placement in the symbol block and thorough action taken to correct the unsatisfactory condition.

10.2.10 Recurring Discrepancy

A discrepancy which recurs on consecutive or subsequent flights after the original problem was recorded is classified as a Recurring Discrepancy.” A Red X symbol shall be placed in the symbol block and thorough action taken to correct the condition of the “Repeat and/or a Recurring Discrepancy.”

10.2.11 In-Process Inspection (IPI)

An IPI is performed during assembly of systems, subsystems, or components in accordance with applicable maintenance directives or by on-condition checks. Maintenance actions involving an IPI are normally identified with specific aircraft inspection requirements. It is essential that maintenance and quality assurance personnel be familiar with IPI requirements. Spot checks of the WI-1103 series forms shall be conducted by quality personnel to ensure compliance with IPI requirements.

Maintenance actions and/or discrepancies requiring an IPI shall be identified by a Red X in the Symbol block of the WI-1103C form. The person who documents the entry in the Discrepancy block shall make the following statement immediately following the discrepancy: "In-Process Inspection (or IPI) Required." The same person shall then enter the following statement beginning on the first line in the Corrective Action block: "IPI CW IAW Item #_____ By _____ Emp. #_____."

An IPI shall be performed by persons authorized and designated by the contractor's maintenance supervisor. The IPI shall be accomplished during a particular phase of assembly or disassembly as identified by work checklists and cards or by an on-condition check..

An inspector who completes an IPI is ensuring that an inspection was completed on the particular system, subsystem, or component identified in an IPI requirements listing and that further assembly is authorized.

The IPI and final inspection of the completed maintenance action does not require inspection by the same inspector. The inspector who signs the Inspected By block shall ensure that an IPI has been complied with and is signed for prior to placing a signature in the Inspected By block and initialing over the Red X symbol.

Part III: Aircraft Maintenance Logbook Forms Instruction on Usage & Disposition

10.3.1 Introduction

This part prescribes the requirements for use and disposition of aircraft maintenance records and forms used in support of aircraft operations at GSFC's WFF. Sample forms are listed as appendices in this section.

10.3.2 Purpose

Aircraft maintenance forms and records shall be maintained in accordance with instructions within this section and GPG 1440.7. When applicable, the requirements identified in FAR, Parts 43 and Part 91 shall be adhered to and any deviation must be approved by the NASA Aircraft Maintenance Manager.

Specific instructions are provided for completion of maintenance forms in this section to ensure that a standardized and correct documentation process exists that reflects pertinent information as well as, status and condition of aircraft, systems, and support equipment.

Regarding assigned aircraft that were previously owned and operated by other organizations, these original aircraft maintenance records are maintained for historical reference only in Addendum A and are not updated. Such aircraft maintenance information is transformed into GSFC's aircraft maintenance system and all applicable information is extracted and forwarded to GSFC's forms and records.

The maintenance and custody of aircraft maintenance records is the responsibility of the ASC quality assurance personnel. Aircraft flight and maintenance records are maintained for each aircraft by the ASC who documents current aircraft operational status, inspections, and discrepancies.

10.3.3 Aircraft Flight and Maintenance Logbook

The NASA WI-1103 series forms are contained within the aircraft maintenance logbook for each aircraft and are used collectively to provide flight data and maintenance status as well as inspection, service, configuration, information for a particular aircraft. The aircraft logbook shall be aboard the aircraft during flight operations.

The ASC is responsible for ensuring accurate documentation and record keeping of forms in their custody. The WI-1103 series forms consists of 1103, 1103A, 1103B, 1103C, 1103D, and 1103E. These forms are designed for use in the standardized aircraft maintenance logbook.

10.3.4 Description of Aircraft Maintenance Log Forms (WI-1103 Series Aircraft Forms)

- A. WI 1103 Aircraft Maintenance Log – The WI-1103 form serves as the maintenance logbook identification cover sheet for a particular aircraft. This form is inserted within the front cover of the flexible binder. Maintenance supervisors shall ensure that the entries within this log are accurate, current and that sufficient forms are available.

- B. WI-1103A Aircrew Flight Mission Data Form – WI-1103A is the source document for tracking individual crewmember flight data. The assigned PIC is responsible for the accurate completion of this form. The PIC shall ensure that the WI Form 1103A is dated and properly completed to reflect pertinent flying data and flight time for all mission personnel. After completion of a flight, the PIC shall initial in the Flight Number block to verify completion of pertinent entries. The completed WI Form 1103A is to be removed from the WI 1103 logbook after the last flight of the day or when a deployed mission returns. The ASC maintenance supervisor or a designated appointee shall review the 1103A for errors and completion. After review, this form shall be initialed in the upper right corner to verify the review and it is then routed to the ASC and NASA operations offices. During the maintenance review, the reviewing person shall ensure that the total flight time recorded corresponds with the times on WI Form 1103B. Time is recorded in hours and tenths of minutes. The completed WI Form 1103A is maintained in a historical file at the NASA Aircraft and Operations Office.

- C. WI 1103B Aircraft Flight Status and Maintenance Form – This form is used to document maintenance status, authoring signatures, servicing information and accumulated time, landings and cycles. This form also indicates the status and history of inspections that are specifically related to daily flight activity. The WI 1103B form shall be removed from the log binder prior to the next days flight activity. The assigned maintenance person shall prepare and update the WI Form 1103B prior to flight to include the top of page heading information. When daily flight activity involves more than one WI 1103B page, a “Page __ of __” shall be inscribed in the upper right corner. The following instructions pertain to use of WI Form 1103B:

(1) Inspection Abbreviation

The following abbreviations are used to describe types of inspections:

- PR - Preflight
- TH - Thruflight
- BPO - Basic Post Flight
- PR/PBO - Combined Preflight and Basic Post Flight
- HPO - Hourly Post Flight
- PR/TH - Combined Preflight and Through Flight
- HSC - Home Station Check
- PH - Phase
- PE - Periodic

(2) Status Block for Overdue, In-Progress, and Accomplished Inspections

The personnel who accomplish or supervise aircraft inspections shall enter the type inspection, signature, local date and time of completion in the appropriate columns. The time and date that an inspection was completed along with the personnel's name in the Accomplished By column shall be carried forward to the Status, In-Progress and Accomplished Inspections block of a new form providing the validity period of the inspection has not expired. The individual transcribing the entries shall enter the abbreviations "CF" (carried forward) and their name initials in the Accomplished By column of the old form. The name of the individual in the Accomplished By column of the form shall be printed on the new form with the time and date.

(3) Certification of Basic Postflight and Thruflight Combined PR/BPO or PR/TH Block

Certification of Basic Postflight (BPO), Thruflight (TH) and Combined Preflight (PR)/BPO, or PR/TH is annotated and signed within the certification block. The personnel accomplishing the BPO, TH, combined PR/BPO or PR/TH shall enter the applicable flight number, the type inspection, signature, local date and time completed. When a maintenance thruflight or pilot preflight inspection is performed, an entry shall be made opposite the applicable flight number to indicate that the inspection was performed.

(4) Aircraft Status Data

Upon the initiation of the Form WI 1103B, the last status symbol (see 10.2.2-6) of the previous form shall be brought forward to Box 1 on the new form. If no discrepancies exist on the aircraft, the initials of the person, who accomplished or supervised the last preflight inspection shall be entered in Box 2. If discrepancies exist, Form WI-1103C is completed. The status symbol recorded in these boxes shall always represent the most serious condition. When a maintenance status change occurs, the next open box shall be used to record the applicable symbol. Symbol entries recorded in these columns shall not be erased, initialed over, or changed even if entered in error. Any symbols entered in error shall be explained by a WI Form 1103C entry prior to entering a new correct status symbol in the next open box.

An authorizing contract maintenance official is responsible for checking the aircraft status prior to flight and signing the “Maintenance Release of Aircraft for Flight.” When maintenance personnel are not available to release an aircraft, such as when the aircraft is in a deployed status, the status check and release becomes the responsibility of the PIC. The PIC shall check the servicing entries recorded on the form and verify that the quantities of fuel are adequate for the flight. After each flight, the PIC shall complete entries for “Airframe Time, Landings, Engine Cycles, and Flight Condition Data.”

The status box number column shall be used to record the number for the “Status Today” block for which a “Maintenance Release of Aircraft” and “Pilots Acceptance of Aircraft for Flight” are being signed. This entry is the responsibility of the individual who signs the “Maintenance Release of Aircraft for Flight.” If a maintenance official is not available (such as during some deployments), the PIC in consort with assigned, deployed maintenance officials is authorized to both release and accept an aircraft.

A maintenance release of an aircraft for flight and a PIC acceptance of an aircraft for flight is required prior to each originating flight. Thruflight by the same PIC where no maintenance action occurs does not require another release. Under no circumstances shall a release be granted when the aircraft status is indicated by a Red X symbol. The maintenance release and pilots acceptance of an aircraft

serves as certification that the authorized individuals have sufficiently investigated the condition of the aircraft to ensure that the aircraft is safe for flight. A list of personnel designated to sign a maintenance release of an aircraft for flight shall be provided and approved by ASC.

When a maintenance release is signed, additional signatures are not required during the period of “preflight validity” unless additional red symbol discrepancies are entered or unless the WI Form 1103B is removed. If an additional symbol is entered on the form prior to the preflight validity period, the prior signature is no longer valid and another release is necessary. The “Pilots Acceptance for Flight” signature is effective only for those flights in which the accepting pilot is the assigned PIC.

To indicate the number of outstanding items that are covered by the maintenance release and pilot acceptance, the responsible maintenance person shall draw a red line under the last entry in the WI Form 1103C. After the Maintenance Release of Aircraft for Flight is signed, the PIC shall place initials at the left margin of the WI Form 1103C beside the red line entry after review of the respective maintenance items. If no additional red symbol entries are annotated and another PIC individual signs the “Pilot’s Acceptance of Aircraft for Flight”, the succeeding PIC shall initial immediately above the original initials on the WI Form 1103C. If a new red symbol entry is recorded, a new red line shall be drawn under the last item by maintenance personnel to indicate coverage of the next “Pilot’s Acceptance of Aircraft for Flight” signature. When this occurs, a new “Maintenance Release of Aircraft for Flight” is required. If the same PIC that signed the previous “Pilot’s Acceptance for Flight” reviews the discrepancies and corrective actions, this PIC may initial beside the red line and release the aircraft without another signature in the “Pilot’s Acceptance of Aircraft for Flight” block, provided the status has not changed.

(5) Airframe Time

Upon initiation of a new WI Form 1103B, the total time shall be transcribed from the “Total” block of the previous form to the new form. At the completion of each flight date, the flight time on each WI Form 1103B shall be recorded by the

assigned PIC in the appropriate blocks. These entries shall be added for a new total entry in the “Total” block at the end of the flight date.

(6) Landings

The “Landings” block shall be used to record “Full Stop” and “Total” landings on aircraft requiring landing gear system inspection and maintenance. The PIC is responsible for completing this data. These entries shall be added for a new total entry in the “total” block at the end of the flight date.

(7) Engine Cycles

For each operating engine, a history of operating cycles is maintained for compressors, turbine disks, and other designated components to determine fatigue life. The PIC shall document, on the applicable “flights” line, the cycles which have occurred during the flight or ground run.

(8) Flight Condition Data

Entries in this block (with the exception of Oxygen Press/Qty.) are the responsibility of the PIC. The assigned maintenance personnel shall record the total Oxygen Press/Qty. following the completion of a flight. Prior to flight release enter the oxygen system pressure or quantity. The individual making the check shall ensure that the pressure or quantity is at or above the minimum prescribed in the applicable maintenance manual. This block shall be left blank for aircraft not equipped with oxygen. If an overtemperature of a jet engine is encountered, the temperature observed is listed and a description of condition, including the number of events, maximum temperature and duration of the overtemperature shall be recorded on the WI Form 1103C. Additionally, if an overtemperature is encountered during ground operation, a descriptive entry shall also be recorded in the Flight Condition Data block and on the WI Form 1103C. Auxiliary engine or auxiliary power unit (APU) operating time shall be entered by the aircrew in the column titled “Aux Engine or APU Operation” which represents actual hours of operation. Aircrew entries may be omitted when an auxiliary engine or APU is equipped with an hourmeter or the unit is not a time change item.

(9) Fuel Servicing Block

Enter the fuel grade, total quantity (gallons) of fuel serviced or drained at one operation and total in tanks for a particular fueling. If no service is required, a “0” (zero) shall be entered in the Quantity Serviced block to serve as a positive indication that the tanks have been checked but not serviced. Total quantities of fuel drained shall be entered in RED and shall carry a minus sign prefix. These entries shall be made immediately upon completion of the servicing by maintenance personnel performing or supervising the servicing.

(10) Total Fuel in Tanks

Enter the quantity of fuel in all tanks after servicing, draining, or completion of an “in-tank” check on the service number line corresponding to the Fuel Servicing number.

(11) Servicing Certification

The individual who performs or supervises a servicing, draining, or “in-tanks” check shall enter a signature in the Serviced By block that corresponds with the numbered servicing or draining in the Fuel Servicing block. The station identifier and date of servicing shall be entered in the corresponding AT block.

- C. WI-1103C Maintenance Discrepancy and Work Correction Form - The WI Form 1103C is used to document each discrepancy discovered by aircrew or maintenance personnel. In addition, this form contains adjacent blocks to describe corrective action. The following instructions pertain to the use of WI Form 1103C:

- (1) Form Management - Maintenance personnel shall ensure that a sufficient quantity of forms are in the Aircraft Maintenance Logbook. Removal of forms from the logbook requires ASC maintenance supervisory authority. Transcribing of open discrepancies to new WI Form 1103C is required when pages are removed. Maintenance supervisory personnel as well as quality assurance personnel shall continually review active WI Forms 1103C for corrective action of discrepancies, removal of pages and filing.

- (2) Form W-1103C Heading Information - Page numbers shall be numbered sequentially (Example: Page 1 of 3 Pages.) The front and back of this form shall be considered as separate pages and shall be numbered accordingly. Enter the dates to indicate the elapsed period covered by the form. Example: From 10/7/95 to 12/7/95 (month, day, year). The first date shall represent the date on which the form was initiated and the last date is the date in which the form was closed out and removed from the aircraft. All logbook forms that are used between the initial form and the close out form shall bear the same “to and from” date. This entry will provide a positive means of determining whether any forms are missing from the aircraft file. All forms containing the same To and From dates shall be securely fastened together to prevent loss. The minimum required heading information for the WI Form 1103C shall be a complete heading for page one and all even numbered pages. On uneven numbered pages, include page number, from and to dates, MDS, and serial number.
- (3) Symbol Block- Enter the proper symbol for each discrepancy recorded. Symbols shall never be erased, even if entered in error. When a discrepancy is corrected, an initial shall be placed over the symbol. Red Dash and Red Diagonal symbols shall be initialed by the individual who performs, quality checks or supervises the corrective action. If the defect has a “Red X” symbol, the corrective action must be inspected and signed off by an inspector or supervisor designated to clear “Red X” symbols.
- (4) Discrepancy Discovery Information - An aircrew member or maintenance technician entering a discrepancy shall print the discovery date and a thorough description of the discrepancy in the first open block. An aircrew member shall enter all defects noted before, during, and after each flight. A discrepancy block is limited to one discrepancy; however, many discrepancy blocks may be used to completely describe a single discrepancy.

Prior to entering discrepancies, the forms shall be previewed to prevent duplication. If a previous discrepancy is considered to be more serious than represented, it should be upgraded. Aircrew members or maintenance personnel shall enter their signature and employee number in the “Discovered By” block for each discrepancy recorded. When a “Red X” discrepancy is of a serious nature

and operation of the affected system(s) would be hazardous or result in further damage, a red warning note shall be included following the discrepancy statement. For example: NOTE - DO NOT apply electrical power to fuel system or operate engines - FIRE HAZARD. The Word “NOTE” must be entered in red followed by the remarks which may also be written in red.

When a maintenance action is stopped before its completion or, if another aircraft system is disrupted other than the one under repair, a descriptive entry shall be made on the WI Form 1103C to warn of this condition.

Specific entries are required for inspections to aircraft systems or components that have been subjected to unusual wear and tear that may cause a potential problem. The entries shall be made by the individual having initial knowledge of such occurrences regardless of the apparent condition of the aircraft. As an example, an entry shall be made in the “Discrepancy” block when an aircraft has:

- (a) Been involved or damaged in a ground or air mishap.
- (b) Encountered severe turbulence or icing during flight.
- (c) Made contact with a foreign object.
- (d) Exceeded the airspeed or “G” load limitations.
- (e) Made a hard landing.
- (f) Used excessive braking.
- (g) Flown a sustained flight at low altitude over salt water.
- (h) Required special inspection, accessory replacement, operational check or functional check flight due or a scheduled inspection (PR, PR/BPO, BPO, TH, Etc.) overdue.

Only one defect shall be entered in each “Discrepancy” block of the WI-1103C. With such entries, the technician shall enter the proper symbol and discovery date in the appropriate blocks. Discrepancies discovered during scheduled inspections shall also be recorded on WI 1103C Forms. In this case, the forms are used solely for documenting discrepancies found during the ongoing aircraft inspection. An entry shall be recorded on the normal WI 1103C Form to reflect that an inspection is in progress with an appropriate symbol in the “Symbol” block. Upon completion of the inspection and prior to flight, all uncleared discrepancies recorded in the phase package shall be transcribed to the aircraft

maintenance log on either the WI 1103C or WI 1103D Forms with correct symbology. During the inspection, all Red X conditions shall be entered in the aircraft maintenance log using the WI 1103C Form. When an item is removed and is not immediately replaced and is considered to be equipment that is temporarily removed (ETR), the reason for removal and the signature, with employee number of the maintenance person shall be entered in the “Discrepancy” block. Repeat discrepancies shall be identified by entering a red "REPEAT" in the discrepancy block.

- (5) Corrective Action - When a discrepancy in the WI Form 1103C is cleared, a description of the corrective action shall be documented in the “Corrective Action” block and the date shall be entered in the “Date Corrected” block. Blocks are provided under the corrective action column to enter information relative to scheduled or unscheduled component replacement items. These blocks include information necessary to make permanent logbook entries such as for manufacturer’s part numbers, serial numbers of components.
- (6) Transferred By - When a new WI Form 1103C is initiated, any uncorrected discrepancies other than “Red X” items or “Red Note” items, may be transferred to the WI Form 1103D. The name of the individual who made the initial entry in the WI Form 1103C need not be continued with the discrepancy transfer to the WI Form 1103D or to a new WI Form 1103C. When a discrepancy is carried forward to a new WI Form 1103C, the individual transcribing the form shall enter the page number, item number, date of the new form, and signature in the “Transferred By” block. If the discrepancy is to be transferred to the WI Form 1103D, enter the date of the transfer action and place the appropriate signature in the “Transferred By” block. (An initial need not be placed over the symbol for the discrepancies that are carried forward or transferred to another form since this only represents transcribing action and does not correct the reported condition.) When a discrepancy is carried forward to a new WI Form 1103C or is transferred to the WI Form 1103D, a parts supply document number, if applicable, shall be carried forward with the discrepancy.
- (7) Corrected By and Inspected By - The Corrected By block is completed when the entry in the discrepancy block has been corrected. When the entry, listed in the “Discrepancy” block is corrected, the signature of the technician who performs or

supervises the corrective action shall be entered in the “Corrected By” block. If an inspection by a supervisor or an inspector is required, as in the case of the “Red X”, the inspection shall be certified by a signature in the “Inspected By” block and last name initial placed over the Red X symbol.

- (8) Employee Number - The employee number of the individual that makes the entry in the Discovered, Transferred, Corrected, or Inspected By blocks shall be legibly entered in the Employee Number block. In the absence of a specific employee number, the last four digits of the employees social security number may be used.
- (9) Operational Checks - Operational checks that are performed in accordance with scheduled inspection and maintenance requirements shall be entered on the WI Form 1103C. An operational check shall be part of the maintenance action and shall be documented in the Corrective Action block by including a statement such as "OP CK OK." In the event that the operational check cannot be accomplished concurrent with or immediately after completion of the maintenance action, the original entry shall be closed by describing the corrective action with a statement that an operational check is required. When this situation occurs, a new entry for the operational check shall be made in the next open block of the WI Form 1103C. The original entry and the operational check entries must refer to each other by entering "see page and item number." The operational check entry must adequately describe the reason for the operational check with the prescribing technical manual, data, etc. When an inflight operational check is required to verify or supplement a ground check and does not involve an FCF, a WI Form 1103C entry shall be made to describe the type and extent of the check needed. When an inflight operational check is completed, the remark "OP CK OK" shall be entered in the “Corrective Action” block; the last name initial of the individual who completes the operational check shall be entered over the symbol in the “SYM” block, and their signature entered in the “Corrected By” block.
- (10) Functional Check Flights (FCF) - A statement indicating the reason for an FCF shall be entered in the Discrepancy block. Discrepancies encountered during an FCF shall be recorded on the WI Form 1103C. After completion of a successful FCF, a statement by the FCF – PIC shall be entered in the “Corrective Action” block to the effect that the FCF was completed and the aircraft is recommended or not recommended for flight release at (local time). If an FCF was performed to

complete a scheduled inspection and the FCF fulfills all of the inspection requirements, the scheduled inspection completion shall be documented on the WI Form 1103C by maintenance officials and the change in inspection status shall be documented on the WI Form 1103D. If subsequent check flights are required, applicable discrepancies shall be changed to reflect specific equipment requiring the functional check flight. The initials of the pilot who performs the “FCF completed” entry on the WI Form 1103C shall be entered over the symbol in the “SYM” block and the signature entered in the “Inspected By” block. To eliminate duplication of FCF entries on the WI Form 1103C, the original FCF entry shall be utilized for additional check flights when the original condition or maintenance work requires further testing. If a condition occurs during the FCF which requires another FCF following additional maintenance work, a new entry shall be made on the WI Form 1103C for the new discrepancy.

(11) Recording Engine Storage

When installed engines are placed in storage, entries shall be made on the WI Form 1103C to indicate the type of storage and which provisions of the applicable maintenance manual are requiring compliance. Examples: “Engine in temporary storage, tech. ref., sect., para.; CW “or” Engine in 1 to 30 days storage, tech. ref., sect., para., CW”. When an engine is removed from storage status, a reference to the depreservation instructions that were used shall be recorded in the “Corrective Action” blocks.

E. WI Form 1103D AIRCRAFT INSPECTION, ENGINE DATA, CALENDAR INSPECTION, AND DELAYED DISCREPANCY FORM - The WI Form 1103D is used to document scheduled inspections; number, type and frequency of inspections; engine data; technical directive status; and delayed discrepancies. The following instructions pertain to the use of WI Form 1103D:

- (1) Aircraft Inspection Status - The spaces to the right of the title Next Periodic Major or Phased Inspection Due No. shall be used to document the number and type of the next inspection that is due. The Type, Frequency, Completion, and Next Due columns shall be used to identify the types of inspections (including HSC and HPO); the inspection frequency; the aircraft time and date of inspection completion; and the aircraft time and date at which the next inspection is due.

Upon completion of the prescribed inspection, the old completion date, and the Next Due time shall be entered.

- (2) Engine Data - This block is provided to record engine Type, Position, Serial Number, and Engine Change Due Time. In the space provided for Type, enter the complete type and series designation of the engines installed. Enter the serial number of each engine in the space provided opposite the applicable number in the PSN column that denotes the position of the installed engine. In the Eng Change Due Time column opposite the applicable engine, enter the aircraft/engine time at which the next engine change is due. The Remarks block shall be used for recording additional information as needed and may also be used to record replacement engine data. When an engine is replaced, the old information shall be lined out. Only current engine entries shall be transcribed when initiating a new form.
- (3) Calendar Inspection Status - Since 30 and 90 day calendar inspections of aircraft become due primarily when an aircraft does not fly or is out of commission for a specified period of time, the use of this block is normally required only when the aircraft is placed in storage or is undergoing extensive maintenance. When applicable, enter the date of the last flight; the type of inspection required (30 to 90 days) and the date at which the calendar inspection will become due.
- (4) Status of Depot Inspections - Leave this block blank.
- (5) Immediate and Urgent Action Technical Directives Completed Within the Past 10 Days - Enter all immediate and urgent action directives upon their compliance. When initiating a new WI Form 1103D, all immediate and urgent action directives that have been completed within the past ten days shall be entered.
- (6) Higher Authority Inspections - This block is to be used at the discretion of the contract maintenance supervisor or the NASA Aircraft Maintenance Manager.
- (7) Calendar and Hourly Inspection Schedule - This block shall be used to document calendar inspection items that are to be inspected or tested at a specified hourly or calendar periods. The items listed shall be primarily those short term, special inspection requirements which frequently become due. Short term items are those

having a calendar interval of less than six months or an hourly interval less than the periodic inspection interval. Entries shall be maintained for those accessories which require an oil change or lubrication on a basis of actual operating hours. When required and to facilitate completion of the DD Form 2026 (Soap Samples), a single line entry shall be made on the WI Form 1103D, stating "Engine SOAP samples due." This will provide a history of oil samples at specified hourly intervals and the next oil sample due date. Oil sample due times can be computed using the aircraft time.

- (8) Inspection Item - Enter in this column those items to be inspected or tested at specified hourly or calendar periods. To establish uniformity, the special hourly and calendar inspection items shall be listed in the appropriate interval groups. A two line entry shall be used for those items requiring inspection at either an hourly interval or a calendar period. One line shall be used to indicate the hourly interval and the next line to indicate the calendar time at which the inspection is due. Recurring inspection items which are due at and accomplished concurrently with specified post flight or periodic inspections, shall not be considered as special hourly items and shall not be listed on this form.
- (9) Frequency - Enter the frequency of the inspection.
- (10) Next Due - Enter the aircraft or engine hours or calendar date when the next inspection is due. Upon completion of the scheduled inspections listed in this block, the date or hours reflected in the Next Due column for the completed inspection shall be lined out and the next date or hours as applicable shall be entered in the next space. When due, enter the inspection item in the WI Form 1103C with the proper symbol, and sign it off in the WI Form 1103C.
- (11) Urgent Action, Outstanding Routine Action Technical Directives and Delayed Discrepancies - All Urgent Action directives, Routine Action directives, Routine Action Safety Modification directives that affect or restrict operating performance or operating limitations or procedures, as well as delayed discrepancies shall be entered in this block. Urgent Action and safety related directives shall be entered upon notification of applicability if not entered on the WI Form 1103C in anticipation of immediate accomplishment. Any other specific directive designated by higher authority may be listed individually. Delayed discrepancies may be

transferred from the WI Form 1103C. Red X entries shall not be entered on the WI Form 1103D. The following related instructions are provided:

- (a) The responsible maintenance personnel shall enter the proper symbol in the SYM block.
- (b) Enter the Directive number, date, and short title in the Technical Directive Number and in the Publication Date or Discrepancy column. When delayed discrepancies are carried in this section for reasons other than parts, a brief explanation shall follow the discrepancy.
- (c) Enter the supply document number for all delayed discrepancies, if applicable, in the Document Number column.
- (d) Maintenance personnel shall enter the date in the applicable column for each entry. The date shall be transcribed from the form on which the entry was originally documented. For Technical Directives entered, the date column shall reflect the date of entry that was posted and the aircraft time column shall reflect the grounding date.
- (e) When a delayed discrepancy or directive entry on the WI Form 1103D is to be corrected or accomplished during unscheduled maintenance, the entry must be transferred to the WI Form 1103C so a brief description of the action taken can be documented.
- (f) When an entry is transferred, the person accomplishing the action or verifying compliance shall enter their signature and employee number for the entry in the Transferred By or Completion Verified block. The completed entry shall be lined out with a single line except for the date and signature blocks. This line will denote that the entry is no longer open. When a Red Dash symbol is involved, the line shall be drawn above or below the red dash, so it will not obliterate the symbol.
- (g) When it becomes necessary to initiate a new WI Form 1103D, open directives, delayed discrepancies, and other data affecting the status of the aircraft shall be carried forward to a new form. Upon completion of the

transcribing action (initiation of a new form) the transcriber shall enter a signature in the Signature space at the bottom of the WI Form 1103D.

F. WI Form 1103E - AIRFRAME/ENGINE FLIGHT DOCUMENT - The WI Form 1103E is used to document aircraft time and engine data including operating time. The crew chief or alternate is responsible for making the entries on the WI Form 1103E. The following WI Form 1103E instructions are provided:

- (1) Heading - Self Explanatory
- (2) Date - Enter the aircraft operating date on the first open line and complete each next open space in this column as applicable.
- (3) Airframe Time - Enter in the first available space the aircraft time reflected in the last entry of the previous WI Form 1103E. The last aircraft time entry in this column shall always correspond with the aircraft time entry recorded in the Airframe Time block on the WI Form 1103B. During each day that the aircraft is flown, the time accrued for that day's flying shall be entered on the line opposite the specific data entry identified with that days operation. This entry shall be added to the previously recorded time to provide new totals.
- (4) Engine/Position/Time and SOAP Data - In this column, enter the applicable engine serial number and position number location. Enter the engine time reflected in the last entry of the previous WI Form 1103E if applicable. Entries of engine time shall be documented in the same manner as aircraft time. When required, SOAP recorded entries in this column shall reflect exact time remaining prior to engine oil analysis sampling. The aircraft time for each day's flight is entered in the Airframe column and shall be duplicated in the SOAP block. This time shall be deducted from the previous SOAP entry to reflect time remaining until the next SOAP is due. After completion of a SOAP sampling, the time of 25.0 hrs., shall be projected in the Soap Total block for that particular engine.
- (5) APU/APP - This column shall be used to record and track accumulative time on the Auxiliary Power Unit (APU) or Auxiliary Power Plant (APP).

- (6) Carried Forward - When all columns have been completed or when columns have been utilized to the extent that initiation of a new WI Form 1103E is necessary, individual airframe and engine times shall be totaled and entered in the appropriate blocks within the line titled "Carried Forward." As applicable, the existing SOAP time shall also be carried forward to the new form. When corrections are made to the airframe, engine operating time, or SOAP documentation data, they may be entered in red to highlight the changes or a red line may be drawn under the corrected data line to highlight the action.

Section Ten

Appendix 10A:

Aircraft Flight Report and Maintenance Records

<u>Form</u>	<u>Pages</u>
WI-1103	10A-2
WI-1103A	10A-3
WI-1103B	10A-4
WI-1103C	10A-5
WI-1103D (front)	10A-6
WI-1103D (back)	10A-7
WI-1103E	10A-8

				Aircraft Serial Number
Aircraft Type, Model, Series				Location
Fuel Capacity	Internal	External	Total	Assignment
(pounds, gallons or liters)				
Oil Capacity	Each Engine	Auxiliary Tanks	Possession	
(quarts, gallons or liters)				

Aircraft Flight Report and Maintenance Record

HOURS AND MINUTES TO HOUR AND TENTH CONVERSION TABLE

1 thru 2 minutes	=	.0 hour
3 thru 8 minutes	=	.1 hour
9 thru 14 minutes	=	.2 hour
15 thru 20 minutes	=	.3 hour
21 thru 26 minutes	=	.4 hour
27 thru 33 minutes	=	.5 hour
34 thru 39 minutes	=	.6 hour
40 thru 45 minutes	=	.7 hour
46 thru 51 minutes	=	.8 hour
52 thru 57 minutes	=	.9 hour
58 thru 60 minutes	=	next whole hour

MISSION DATA													
Date		MDS		Serial Number		Organization		Location		WFF Aircraft Report No.			
Flt. No.	Flt. Code	Project No.	Project Name	From	To	Take Off Time	Land Time	Flt. Time	Lndgs.	Flt. Codes	Time Conv. Table		
1										A = Admin/Cargo B = Ferry C = Training D = Maint. Test E = Maint. Ferry F = Proj. Support G = R&D H = Other	1 thru 2 min. = 0 hour 3 thru 8 min. = 1 hour 9 thru 14 min. = 2 hour 15 thru 20 min. = 3 hour 21 thru 26 min. = 4 hour 27 thru 32 min. = 5 hour 33 thru 38 min. = 6 hour 39 thru 44 min. = 7 hour 45 thru 50 min. = 8 hour 51 thru 56 min. = 9 hour 57 thru 60 min. = next whole hour		
AIRCREW DATA													
Flt. No.	Flt. Crew	Posit. AC	IP	Inst. Time A	S	Approaches P	N	Landings D	N	NT Hrs.	FL Hrs.	CREW MEMBERS AND PASSENGERS	
1	P									:	:		
	CP									:	:		
	CP									:	:		
	FE									:	:		
2	FE									:	:		
	P									:	:		
	CP									:	:		
	CP									:	:		
3	FE									:	:		
	FE									:	:		
	P									:	:		
	CP									:	:		
4	CP									:	:		
	FE									:	:		
	FE									:	:		
	FE									:	:		

Aircrew/Mission Flight Data Document

NASA WF-1103A (8-92)

Date		Crew Chief		Organization		Location		MDS		Serial Number		
STATUS OF OVERDUE, IN PROGRESS, AND ACCOMPLISHED INSPECTIONS						CERTIFICATION OF BASIC POSTFLIGHT AND THRU FLIGHT, COMBINED PR/BPO OR PR/TH						
Type	Accomplished By			Completed Date Time		Flt. No.	Type	Accomplished By			Completed Date Time	
				/ / : :		1					/ / : :	
				/ / : :		2					/ / : :	
				/ / : :		3					/ / : :	
				/ / : :		4					/ / : :	
AIRCRAFT STATUS DATA												
See forms W1-C and D for explanation of the status symbol	Status Today	Box No.	Maintenance Release of Aircraft for Flight (Signature)				Flt. No.	Pilot's Acceptance of Aircraft for Flight (Signature)				
	1	5					1					
	2	6					2					
	3	7					3					
	4	8					4					
AIRFRAME TIME			LANDINGS		ENGINE CYCLES				FLIGHT CONDITION DATA			
Previous	:		Full Stop	Total	Eng. 1	Eng. 2	Eng. 3	Eng. 4	Over Temp. Enctrd.	Aux. Eng. or APU Op.	Oxygen Press./Qty.	
Flights	1	:								:		
	2	:								:		
	3	:								:		
	4	:								:		
Totals	:								:			
FUEL SERVICING					TOTAL FUEL IN TANKS (GALLONS, LITERS, POUNDS)							
Service Number	Fuel (gallons, liters, pounds)			No. 1 Tank		No. 2 Tank		Fuselage Aux. Tanks	No. 3 Tank		No. 4 Tank	
	Oct. or Grade	Quantity Serviced	Total in Tanks	Main	Left Ext.	Main			Main		Main	Right Ext.
1												
2												
3												
4												
SERVICING CERTIFICATION (Signature and Station at which servicing is accomplished)												
1	Serviced By			3	Serviced By			5	Serviced By			
	At	Date / /			At	Date / /			At	Date / /		
2	Serviced By			4	Serviced By			6	Serviced By			
	At	Date / /			At	Date / /			At	Date / /		

Date From / /		Date To / /		Crew Chief		Organization		Location		MDS		Serial Number	
SYM	Date Discovered / /		Doc. No.		CF To P I		Dated / /		Transferred to Date / /		Date Corrected / /		
Discrepancy						Corrective Action							
						Old PN				Old SN			
						New PN				New SN			
						Corrected/Transferred By						Employee No.	
Discovered By				Employee No.		Inspected By						Employee No.	
SYM	Date Discovered / /		Doc. No.		CF To P I		Dated / /		Transferred to Date / /		Date Corrected / /		
Discrepancy						Corrective Action							
						Old PN				Old SN			
						New PN				New SN			
						Corrected/Transferred By						Employee No.	
Discovered By				Employee No.		Inspected By						Employee No.	
SYM	Date Discovered / /		Doc. No.		CF To P I		Dated / /		Transferred to Date / /		Date Corrected / /		
Discrepancy						Corrective Action							
						Old PN				Old SN			
						New PN				New SN			
						Corrected/Transferred By						Employee No.	
Discovered By				Employee No.		Inspected By						Employee No.	

[illegible]

Section Ten

Appendix 10B:

Summary of Quality Records

Section One Summary of Quality Records					
Record Number/Title	Process	Manual Section	Custodian	File Location	Retention Period
WI-28 Ground Support & Equipment Maintenance Record	Ground support equipment (GSE) maintenance	4.5	GSE Specialist	Room E112	1 year
WI-929 Stores Stock Requisition	Procurement	9.4.1 9.4.3	ASC Maintenance Manager	ASC Room W162 NASA Room W236	3 years
WI-1101 Hold-Off (Danger) Tag	Maintenance Safety	3.2	ASC QA	Room W157	1 year
WI-1103 Aircraft Flight Report and Maintenance Log Record	Aircraft maintenance	10.11 10.12 App. 10A	ASC QA	Room W157	1 year
WI-1103A Aircraft Mission Flight Data Form	Flight data documentation	10.3.4 10.11 10.12 App. 10A	QAE Operations	Room W237	3 years
WI-1103B Aircraft Flight Status and Maintenance Document	Aircraft maintenance	10.3.4 10.11 10.12 App. 10A 11.4.2	ASC QA	Room W157	Life of aircraft
WI-1103C Maintenance Discrepancy and Work Document	Aircraft maintenance	10.3.4 10.11 10.17-21 App. 10A 11.4.2 11.4.5	ASC QA	Room W157	Life of aircraft
WI-1103D Aircraft Inspection, Engine Data, Calendar Inspection and Delayed Discrepancy Document	Aircraft maintenance	10.3.4 10.11 10.22-25 App. 10A 11.4.3 11.4.5	ASC QA	Room W157	Life of aircraft
WI-1103E Aircraft Engine Flight Document	Aircraft maintenance	10.3.4 10.11 10.26 App. 10A	ASC QA	Room W157	Life of aircraft

Record Number/Title	Process	Manual Section	Custodian	File Location	Retention Period
WI-1116 Mission Management/Basic Postflight Inspection King Air B200	Aircraft inspection	11.4.2 App. 11A	ASC QA	Room W157	3 years
WI-1126 Parts Control Tag	Material management	9.8.4	ASC Material Control	Room W162	2 years
WI-1127 Serviceable Tag	Material management	9.8.5	ASC Material Control	Room W162	2 years
WI 1130 C-130 Preflight/Basic Postflight Inspection	Aircraft inspection	11.4.2	ASC QA	Room W157	2 years
WI-1418 Aircraft Configuration Control	Configuration Control	8.2 8.4.3 8.4.4 8.6 8.6.3	NASA QA	Room W236	Life of aircraft
WI-1436 Lockheed P-3 Aircraft Preflight/Basic Postflight Inspection	Aircraft inspection	11.4.2 App. 11B	ASC QA	Room W157	3 years
WI-1464 Engine Performance Trend Data Form	Maintenance monitoring	App. 11A	ASC QA	Room W157	Until hot section or engine overhaul is done
WI-1472 Program Support Aircraft Spares Support items	Material management	9.4.2	ASC Material Control	Room W162	2 years
WI-1500 Weekly Aircraft Status Form	Maintenance Readiness	11.4.7	ASC Maintenance Control	Room W161	1 year
WI-1510 Inflatable Survival Equipment Historical Record	ALSE maintenance	5.2.5	ALSE Specialist	Room W139	Remains with equipment for life of the equipment
WI-1536 Maintenance Cannibalization Request/Action Form	Material management	9.8.6	ASC Material Control	Room W162	Life of the equipment
WI-1537 Ground Support Equipment Inspection and Maintenance Record	GSE maintenance	4.5	GSE Specialist	Room E112	Life of the equipment
WI-1544 Engineering Change Proposal	Aircraft Configuration Control	8.4.2 8.6 8.6.3	NASA QA	Room W236	Life of aircraft

Record Number/Title	Process	Manual Section	Custodian	File Location	Retention Period
WI-1545 Nickel-Cadmium Aircraft Battery History Card	Avionics maintenance	6.8 8.2	ASC Avionics Supervisor	Room W165	Life of the battery
WI-1547 Master Altimeter & Altimeter Test Set Record	Avionics maintenance	6.8	ASC Avionics Supervisor	Room W165	Maintained until an altimeter change in the test set
WI-1557 Spot Check Quality Verification Inspection (QVI) Reporting Form	Quality Assurance	2.13	NASA QA	Room W236	5 years
Section Two Records Indexed by Manual Section (No Form Numbers)					
ASC Quality Assurance Plan	QA	2.6	COTR	Room W235	Life of ASC contract
NASA Surveillance Plan	QA	2.6	COTR	Room W235	Life of ASC contract
Tool Control Master Inventory List	Tool Control	2.7	ASC QA	Room W157	Update frequently
ASC Maintenance Safety Meetings	Safety	2.12	ASC QA	Room W157	3 years
IMTE Usage Log	Calibration	App. 2A	ASC QA	Room W157	3 years
Visiting Aircraft Activity Report	Visiting aircraft	3.2.1	ASC Maintenance Supervisor	Room W161	3 years
Semi-annual Inventory Report	Material management	4.5 5.2.5 9.8.2	ASC Material Manager	Room E112	5 years
ALSE Custody Records	ALSE	5.2.3	ALSE Specialist	Room W139	Until ALSE turn-in
ALSE Inspection and Test Record	ALSE maintenance	5.2.5	ALSE Specialist	Room W139	Life of ALSE
Seagil Software Company Database	ALSE inventory and status	5.2.2	ALSE Specialist	Room W139	Life of ALSE
Fabrication Shop Preventive maintenance Schedule	Preventive maintenance	7.5 7.8	Fabrication Shop Supervisor	Room W142	2 years
ARB Report	Airworthiness	8.5.6	Chief, Aircraft Office	Room W235	Life of aircraft
Aircraft Weight and Balance	Airworthiness	8.5.7	ASC QA	Room W157	3 years

Record Number/Title	Process	Manual Section	Custodian	File Location	Retention Period
ASC Monthly Procurement Activity Report	Materials management	9.8.1	ASC Material Manager	Room W161	5 years
Quality Records Summary	Records	App. 10B	NASA Technical Librarian	Room W240	5-year manual update
Aircraft Maintenance Time Extension Authorization	Aircraft maintenance	11.3.6	NASA QA	Room W236	Life of aircraft
N8NA CAMP Database	Aircraft inspection	App. 11A	ASC QA	Room W157	Life of aircraft

Section Eleven: Aircraft Inspection and Maintenance

11.1 Purpose

The purpose of this section is to describe policy, requirements and standards applicable to the maintenance of assigned aircraft. Specific aircraft requirements and standards are listed in the appendices to this section.

11.2 Scope

This section and its appendixes address the GSFC aircraft maintenance program in both general and specific terms for assigned aircraft. The quality assurance and safety aspects of aircraft maintenance is primarily addressed in Section 2.

11.3 Policy

11.3.1 General

The maintenance of aircraft involves specific requirements. Checklists and inspection cards are utilized to provide guidance for mechanics and inspectors. Specific instructional information is contained in Section 8 of this manual. Inspection work cards are not intended to be all-inclusive but rather specify minimum requirements. Mechanics and inspectors are expected to utilize inspection cards and their respective skills in understanding and interpreting work requirements associated with them. Changes and supplements to requirements shall be incorporated when deemed advisable. Changes shall be based on factual data accumulated from experience, data submitted by the manufacturer, user input or from other Government agencies. Recommendations for change to maintenance policy, requirements and standards should be submitted to the NASA Code 830, Aircraft Maintenance Manager (QAE - Maintenance).

11.3.2 Personnel Qualifications

Personnel who perform maintenance or inspection work on assigned aircraft must be certified in accordance with FAR, Part 65, Subparts D or E or be supervised by certified personnel. Equivalent military qualifications in specialty areas may be substituted for FAA certificates on a temporary basis at the discretion of the ASC.

11.3.3 Airworthiness Directives

All applicable FAA Airworthiness Directives, manufacturer's service bulletins, technical orders, and other related requirements shall be complied with unless deviations are jointly approved by the NASA Code 830 Aircraft Maintenance Manager and the ASC with the concurrence of 830 Chief, Aircraft Office..

11.3.4 Material

All parts, components, repairables, and consumables used to maintain aircraft shall be of the type, model and specification as that being replaced, exchanged or repaired unless specifically authorized by the NASA Code 830 Aircraft Maintenance Manager. Such items may be new, overhauled, or serviceable but must be properly certified and tagged and shall not have exceeded shelf time limits.

11.3.5 Delayed Maintenance

Correction of discrepancies, other than Red X items, that are found during scheduled inspections or at other times may be delayed if they are not readily correctable and do not adversely affect the airworthiness or the mission performance of the aircraft. Consideration of the combined affects of more than one deferred discrepancy must be evaluated in approving delayed maintenance. Delayed maintenance shall be monitored by supervisory maintenance personnel and corrected at the earliest opportunity.

11.3.6 Time Extension Authorization

Aircraft shall not be operated beyond specified time (hourly or calendar) intervals for required maintenance inspections except as approved by the Code 830/Aircraft Maintenance Manager and the ASC with concurrence from the Code 830/Chief of the Aircraft Office.

11.3.7 Aircraft Modifications

Aircraft modifications and configuration control are primarily addressed in Section 8 of this Manual. In essence, modifications to aircraft are conducted under a controlled process that must be approved by an independent GSFC/WFF Airworthiness Review Board, Code 830/Aircraft Maintenance Manager, Code 830/Quality Assurance Specialist, and Chief of the Aircraft Office. Documentation pertinent to modification shall be included in aircraft historical records with appropriate entries made in the aircraft logbook records.

11.3.8 Aircraft Grounding

It shall be the responsibility of all personnel engaged in the maintenance or operation of assigned aircraft to accurately and promptly report the mechanical and operational condition of

aircraft. Aircraft maintenance records and forms shall be kept current at all times. When any discrepancy is discovered that may affect safety of flight, the subject aircraft shall be grounded until repaired and cognizant maintenance and operational officials notified. Refer to Section 10 of this Manual for information on aircraft logbook entries and notations.

11.4 Aircraft Scheduled Inspection Requirements

11.4.1 General

The aircraft scheduled inspection requirements for GSFC's WFF aircraft have been derived from established systems developed by aircraft manufacturers. Former military aircraft inspection systems are utilized as a basis for program support aircraft that were transferred from military organizations. Mission management aircraft scheduled inspections are regulated by Federal Aviation Administration and provided by the aircraft manufacturer. Scheduled aircraft inspection systems for GSFC's WFF program support aircraft are amended as needed to include manufacturer's recommendations, Federal Aviation Administration directives, and NASA requirements. Inspection requirements and completed records are documented and retained by the ASC quality assurance office.

11.4.2 Basic Inspection Requirements

- A. Preflight Inspection (PR) - The preflight inspection is a flight preparedness check that shall be accomplished in accordance with a preflight checklist for that particular aircraft. The PR is required prior to the first flight of the day unless a combined preflight/basic postflight has been accomplished within the past 24 hours. The preflight consists of operational checks and visual examination to assure flight readiness while using WFF published checklists and workcards. This inspection is documented on Form WI-1103B.
- B. Thruflight Inspection (TH) - The thruflight inspection is a between-flight inspection and shall be accomplished after each flight when a turnaround or a continuation flight is scheduled and a basic postflight inspection is not required. The inspection consists of checking the aircraft for flight continuance by performing a visual examination of the aircraft and conducting operational checks of certain components and systems to assure that no defects exist that would be detrimental to further flight. TH requirements are identified on the preflight/basic postflight inspection checklist by asterisks. An aircraft visual inspection is required when maintenance is not performed and the mission is

continued with aircrew members who are aware of the aircraft's performance and maintenance status. This inspection is documented on Form WI-1103B.

- C. Basic Postflight Inspection (BPO) - The BPO inspection is a more thorough check than the preflight or the thruflight inspection and is accomplished after the last flight of the day. This inspection consists of checking the aircraft condition by performing visual examination of the aircraft and operational checks of certain components and systems to assure that no defects exist that would be detrimental to flight. A BPO is valid for a maximum of 24 hours providing the aircraft is hangared and not operated. This inspection is documented on Form WI-1103B.
- D. Combined Preflight/Basic Postflight Inspection (PR/BPO) - This inspection consolidates the requirements of the preflight and basic postflight inspections into a single inspection that is accomplished at the end of a flying period or before the next flight. It eliminates duplication of inspection items that would occur if separate inspections were performed and has the same validity period as the preflight inspection. This inspection is documented on Form WI-1103B.
- E. Phase Inspection (PH) - The PH inspection is due upon accrual of an established number of operating hours, or at the expiration of a calendar period specified in the applicable scheduled inspection and maintenance requirements for a specific aircraft. The PH inspection is a thorough and searching inspection of the entire aircraft or designated areas of an aircraft in accordance with established requirements for each specific aircraft. PH inspections are scheduled at equal intervals throughout the total inspection cycle.

The primary objective of the phase inspection system is to minimize the time that an aircraft is out-of-commission consistent with inspection requirements. Applicability of the PH inspection system is contained in the inspection workcards. The number of phase packages varies with different aircraft and depends on the inspection requirements and man-hours to perform the phase package. This inspection is documented on Form WI-1103C.

- F. Calendar Inspection (CI) - Calendar inspection are conducted for maintenance requirements that are based on accrual of calendar days as an inspection interval. Calendar inspections are documented on Form WI-1103C.

1. 30-Day Inspection - When an aircraft does not fly or is out-of-commission for more than 30 consecutive days, a basic postflight is required before the aircraft is returned to operational status.
 2. 90-Day Inactivity Inspection - When an aircraft does not fly for more than 90 consecutive days, the following shall be accomplished as a minimum before the aircraft is returned to operational status:
 - a. Complete a basic postflight and preflight inspection.
 - b. Perform operational checks of all aircraft systems (excluding a landing gear retraction test).
 3. 90-Day Corrosion Inspection – A corrosion inspection is performed on a 90-day cycle and includes an aircraft wash, lubrication, and a corrosion examination of airframe and power plant components. This inspection is detailed in the aircraft’s inspection program.
- G. Hourly Inspection (HI) - An hourly inspection shall be accomplished upon accrual of the number of flying hours and/or operating hours specified in the applicable inspection workcards, manufacturers’ notices or local directives. Hourly inspections are documented on Form WI-1103C.
- H. Special Inspection (SI) - Special inspections are those required due to other than normal operational conditions or functional discrepancies. Examples of conditions requiring an SI are hard landings, flight through severe turbulence, exceeding engine limitations, engine failure, trend analysis or spectroanalysis reports, and aircraft wash, lubrication, and corrosion inspections. Special inspections also include inspections specifically required by service instructions, bulletins, airworthiness directives, and military technical directives. Mandatory or optional inspections published by the Federal Aviation Administration, manufacturers’ bulletins and operational letters are categorized as special inspections.

When special inspection work duplicates a portion of a scheduled inspection, it shall be clearly documented with reference to the specific work card item.

Upon completion of an SI an entry shall be documented on the aircraft NASA Form WI-1103C (Maintenance Discrepancy and Work Form). This information shall be documented in the applicable computerized maintenance program.

11.4.3 Aircraft Phase Inspection Criteria

It is the intent of the scheduled phase inspection system to apply standardized requirements for all WFF aircraft. However, the nature of NASA program support aircraft operations vary from industry and military operations and thus, specific inspection schedules and procedures have been established.

Through the application of phase inspections, a portion of the total recurring inspection requirement is accomplished at each phase and the cycle is repeated after completion of the last package. Recurring inspection requirements that have an interval greater than specified for a complete cycle are treated as hourly or calendar inspection requirements and shall be entered on the aircraft WI-1103D form or the automated computerized system for that particular aircraft.

When program support aircraft are scheduled for extended missions, the phase requirements may be accomplished in advance to cover the period of the planned mission. In addition to inspection requirements peculiar to each phase package, recurring inspection items listed in each phase workcard deck may be accomplished once for the entire phase package grouping.

11.4.4 Planning Scheduled Inspections

Preparations for the accomplishment of scheduled phase inspections shall ensure that the required parts, material, and equipment are on-hand and ready for each phase inspection.

Prior to removing aircraft from service for scheduled inspections, aircraft forms and computerized records shall be reviewed in detail to determine the extent of work to be accomplished. This review shall include component time change items, airworthiness directives, and modification orders. In addition, the following is required:

- a. Prepare workcards for the particular phase package.
- b. Verify availability of components and accessories needed.
- c. Assure that required equipment and tools are available and ready.
- d. Assemble all required material, equipment, and technical instructions to accomplish the inspection and work.

- e. Schedule an engine performance run prior to removing the aircraft from service to determine if additional work is needed to correct performance related discrepancies during the aircraft down time.

11.4.5 Inspection Records

Accurate documentation of inspections performed, discrepancies discovered, corrective actions taken, and replacement of components is an essential requirement. Completion of these tasks shall be recorded on NASA WI-1103C (Maintenance Discrepancy and Work Document) and NASA WI-1103D (Aircraft Inspection, Engine Data, Calendar Inspection and Delayed Discrepancy Document).

Discrepancies that are not sufficiently urgent or dangerous to warrant correction prior to flight, may remain uncorrected until receipt of required part(s) or until sufficient time allows for repair.

Upon completion of a phase inspection, the complete phase package is reviewed by quality assurance officials. If incomplete work or documentation errors are noted, QA personnel shall take action to correct errors. When the completed phase inspection package is approved by QA, a log entry validating completion of the phase inspection is documented on the NASA Form WI-1103C and signed by the QA inspector. This entry shall not be documented and signed until the following is assured:

- a. Aircraft maintenance and phase inspection requirements are complete in accordance with applicable maintenance and inspection specifications.
- b. All applicable technical directives and bulletins for the inspection are complete and required entries are recorded.

11.4.6 Specific Aircraft Inspection Requirements

The specific phase inspection requirements that apply to WFF aircraft are listed in the following appendices. Deviation from these requirements for program support aircraft requires prior approval from the NASA Aircraft Maintenance Manager. Deviation from the mission management aircraft inspection schedule is not authorized.

11.4.7 Aircraft Status

A weekly aircraft status report (Form WI-1500) is initiated by the ASC quality assurance office and forwarded to QAE personnel. This form provides status of aircraft with hours or time remaining to the next inspection. Refer to Appendix 10B.

Section Eleven

Appendix 11A:

BE-200/NASA 8

11.A.1 Scheduled Inspection Requirements

An FAA- and Beech/Raytheon-approved Computerized Aircraft Maintenance Program (CAMP) by CAMP Systems, Inc., is utilized to satisfy the requirements of Federal Aviation Regulation (FAR) 91.169(f) (4). The CAMP System is a planned maintenance and inspection program tailored to effectively and continually monitor the maintenance and inspection requirements of the Beechcraft B-200 King Air aircraft. The program is updated on a continuing basis to include the manufacturer's recommendations, FAA Airworthiness Directives, and changes deemed necessary by the responsible FAA Flight Standards District Office. The accomplishment of all inspection and repair work to the aircraft shall be performed by or under the supervision of FAA certified personnel. A certified FAA Repair Station as specified in FAR Part 43.15 is established at WFF. The CAMP provides timely work requirements, guidance and documentation which give maintenance personnel current procedures and space for recording pertinent details. Finally, this Program serves as a quality record medium as well as a performance and reliability data bank.

11.A.1.1 Inspection Cycle

The CAMP Inspection System divides 800 flight hours equally into four individual inspection periods. The periods (Phases #1, #2, #3, and #4) are due 200 hours from the previous inspection.

11.A.1.2 Inspection Process

A CAMP package is provided prior to the due date of each inspection (routine or numbered operation). The required items listed on the requirement sheets shall be accomplished by certified mechanics, technicians, and inspectors. After all requirements have been accomplished, a quality assurance inspector shall file a copy and forward another copy to the CAMP System for updating of records. In addition, the inspection completion date shall be entered in the aircraft records by date, numbered operation, aircraft time, and next due date. A statement releasing the aircraft as airworthy is required.

The quality record is the password-protected CAMP database and is backed up on the CAMP main database system.

11.A.2 Conversion Factor

For the purpose of component replacement and inspection scheduling, the following conversion factor is applicable:

To convert: aircraft hours to landings/cycles: multiply hours by 1.43

To convert: landings/cycles to aircraft hours: multiply landings/cycles by 0.7

11.A.3 FAA Repair Station

An FAA Repair Station certification is maintained at GSFC for the maintenance of B-200/NASA 8. Periodic inspections by the responsible FAA FSDO officials occur to ensure that certification is in accordance with requirements. Necessary repairs are conducted in accordance with Section 8 of this Manual.

11.A.4 Maintenance Monitoring

Form WI-1464 is used to record PT6A-42 engine performance data. Engine readings are recorded at designated intervals on preprinted instructions. The information is entered into the computerized trend analysis program for monitoring engine performance. Deterioration of engine performance may be tracked and thus enables planning for corrective maintenance actions.

Section Eleven

Appendix 11B: P-3B NASA 426

11.B.1 Scheduled Inspection Requirements

The P3B aircraft phase inspection system is based upon NAVAIR 01-75PAA-6-3 and NAVAIR 01-75PAA-6-4 requirements; however, upon transfer of ownership to NASA the military requirements are amended as applicable. The phase inspection system is divided into two phase periods. In addition a 90-day calendar inspection is required at 90 calendar days following completion of the previous phase package. The complete phase cycle is accomplished over a two year period. Inspections are documented in accordance with Section 8 of this Manual

11.B.1.1 A-Phase

An “A-Phase” inspection is performed 12 months or 400 flight hours after completion of the previous phase inspection, whichever occurs first. A Basic Post Flight and 90-day calendar inspection shall be performed in conjunction with the “A-Phase” requirement.

11.B.1.2 B-Phase

A “B-Phase” inspection is performed 12 months or 400 flight hours after completion of the last “A-Phase” inspection, whichever occurs first. A Basic Post Flight and 90-day calendar inspection shall be performed in conjunction with the “B-Phase” requirement.

11.B.1.3 90-Day Calendar Inspection

A “90-Day” calendar inspection is performed 90 days after completion of the first phase inspection package and each 90 days thereafter until the next phase is due. NAVAIR 01-75PAA-6-3 inspection workcards shall be used when accomplishing this inspection.

Section Eleven

Appendix 11C: C-130/NASA 427

11.C.1 Scheduled Inspection Requirements

The C-130 aircraft inspection system is based upon NAVAIR 01-75GAE-6-3 and NAVAIR 01-75GAE-6-4; however, upon transfer of ownership to NASA the military requirements are amended as applicable. The phase inspection system is divided into two phase periods. In addition, a 90-day calendar inspection is required at 90 calendar days following completion of the last phase period. The complete phase cycle is accomplished over a 2-year period. Inspections are documented in accordance with Section 8 of this Manual.

11.C.1.1 A-Phase

An “A-Phase” inspection is performed 12 months or 400 flight hours after completion of the previous phase inspection, whichever occurs first. A Basic Post Flight and 90-day calendar inspection shall be performed in conjunction with the “A-Phase” requirement.

11.C.1.2 B-Phase

A “B Phase” inspection is performed 12 months or 400 flight hours after completion of the last A-Phase inspection, whichever occurs first. A Basic Post Flight and 90-day calendar inspection shall be performed in conjunction with the “B-Phase” requirement.

11.C.1.3 90-Day Calendar Inspection

A 90-Day calendar inspection is performed 90 days after completion of the first phase inspection package and each 90 days thereafter until the next phase is due. NAVAIR 01-75GAE-6-3 inspection workcards shall be used when accomplishing this inspection.